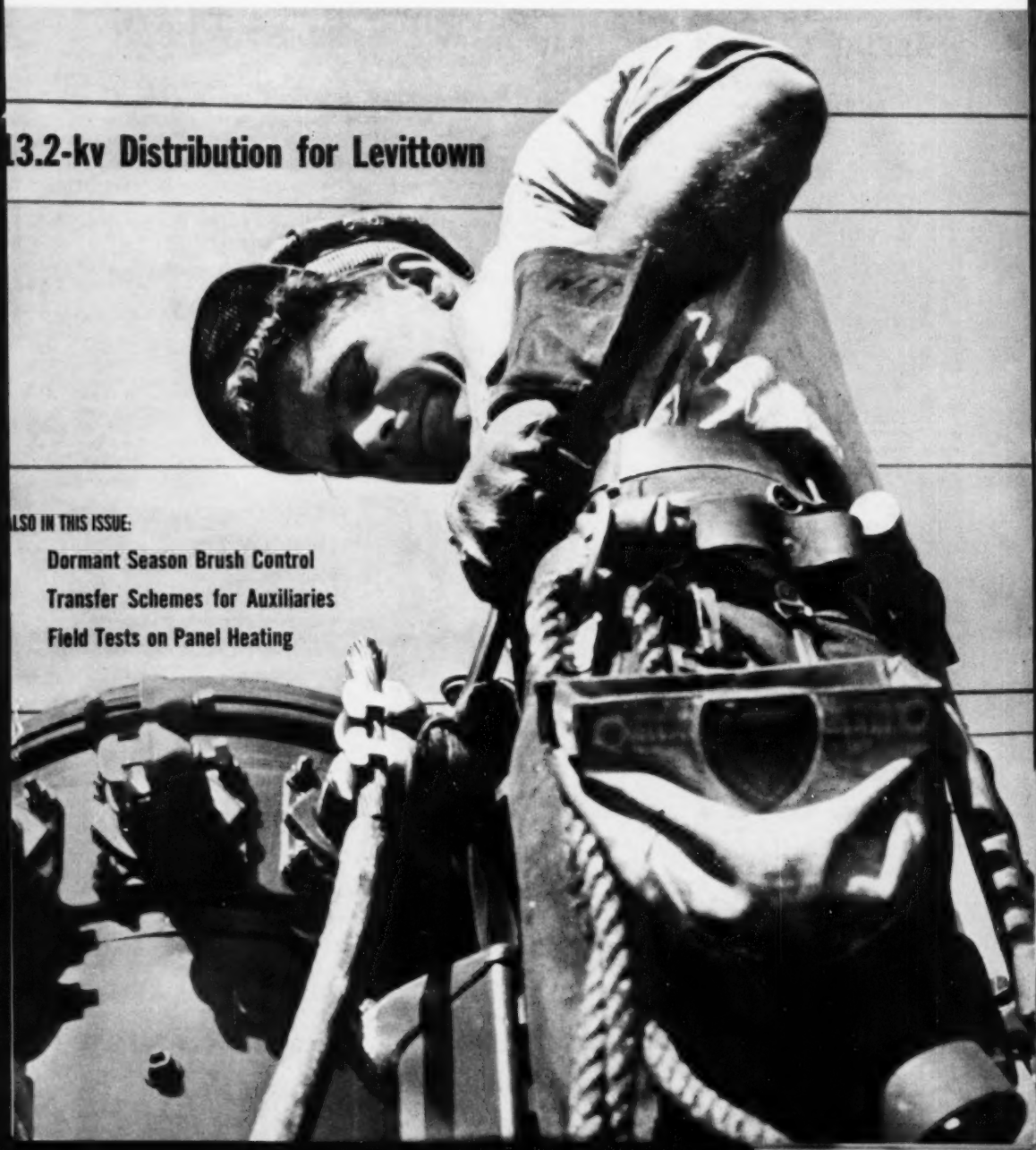
MAY 5, 1952

Electrical World

Price 35 Cents

A McGRAW-HILL PUBLICATION



13.2-kv Distribution for Levittown

ALSO IN THIS ISSUE:

Dormant Season Brush Control

Transfer Schemes for Auxiliaries

Field Tests on Panel Heating

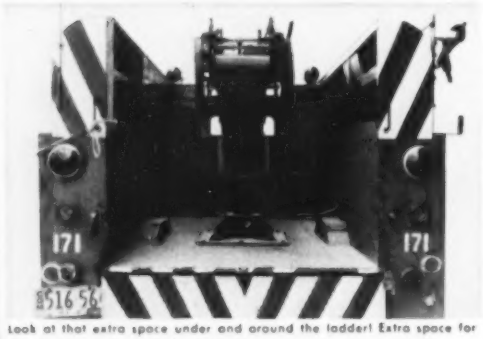
NEW! Murray PEDESTAL STYLE crows'nest

AERIAL LADDER PROVIDES *EXTRA* FLOOR SPACE

Lighter too!
Weighs only 725 pounds

This remarkable Murray Crows'nest has all the advantages of previous Crows'nest models, including semi-automatic inclination and rotational locking, plus extra space for extra loading.

Effortless, speedy operation plus utmost safety are other important advantages of the Murray Crows'nest. It's the *fastest, safest* aerial ladder on the market. Remember, the Murray Crows'nest is the *original* aerial ladder and the name—Crows'nest is a registered trade-mark.



Look at that extra space under and around the ladder! Extra space for loading, extra space for the operator.

Even with the ladder rotated over side of the truck there is plenty of room for the operator. Rotates full 360° in 37½ inches. A boy can turn it.

FROM STOP TO TOP IN 15 SECONDS!

Slight pressure takes ladder out of riding position and raises it to desired inclination in one continuous *safe* operation. Pins snap into locking holes. Improved type of windlass extends ladder easily. All at comfortable working height—no stooping.

PRACTICALLY NUMBERLESS COMFORTABLE WORKING POSITIONS.

The sturdy and safe 24" flat platform is adjustable to suit all inclinations—entire floor is level. Inclinations range 30° to 72°. Top guard rails are standard.

LOCKS AUTOMATICALLY INTO RIDING POSITION

On completion of work, the safety ladder locks are released and the downward path of the upper section is controlled with the brake of the windlass. When returned to riding position, it locks automatically into place. The ladder hugs the top of the cab to give lowest center of gravity.

Murray ...the original and *only* Crows'nest—operates fastest, safest and with the least effort. In addition, the new pedestal style leaves more room for loading. *Write to Ladder Division for complete data.*

Murray®

MURRAY MANUFACTURING CORPORATION
1250 Atlantic Avenue, Brooklyn 16, New York

Service Entrance & Meter Equipment • Fully Magnetic Circuit Breakers • Switches (Types A, C & D) • Current Limiting Reactors • Crows'nest Aerial Ladders

BRINGING SERVICE TO LEVITTOWN

Levittown, L. I., is probably better known than any other town of its size in the United States with the exception of Reno and Oak Ridge. There have been countless magazine and newspaper articles about this miracle town. Most of them have told of the thousands of modern houses that have seemed to spring from the farm lands of Long Island.

In this issue is another article on Levittown. But this one is different. It tells how Long Island Lighting Co licked the job of bringing electric service to over 30,000 homes in the area in four years. If your company has a similar problem or if you are a distribution man, you'll enjoy reading, "Development of Levittown Distribution" on page 92.

DISTRIBUTION FOR TOMORROW

Every May EW publishes one issue that is a special contribution to the industry. The May 19 issue, entitled "Distribution for Tomorrow" will be such a contribution.

One section of these 36 pages will be an industry forecast of the next ten years. To get the material EW held a round table conference attended by 23 executives, statisticians, and economists from utility companies, manufacturers, and government bureaus. In addition the McGraw-Hill Department of Economics was represented. The forecast will summarize the material contributed by these experts.

The remaining pages will be devoted to 11 articles on the various aspects of "Distribution for Tomorrow." Authorities in their fields will cover such subjects as: Specifications for higher-voltage rural lines, needs for 3-phase for residential loads, economical conductor sizes for secondaries, and criteria for a design with regard to voltage fluctuations and system outages.

The issue should be of great assistance to the industry at this time when so many companies having solved their problems of generating capacity are turning their attentions to distributing the output of these new plants.

And best of all, the articles will not be packed with theory. They will be written in down-to-earth style and will be amply illustrated so that the man who will do the job can understand them.

Electrical World

Published for 78 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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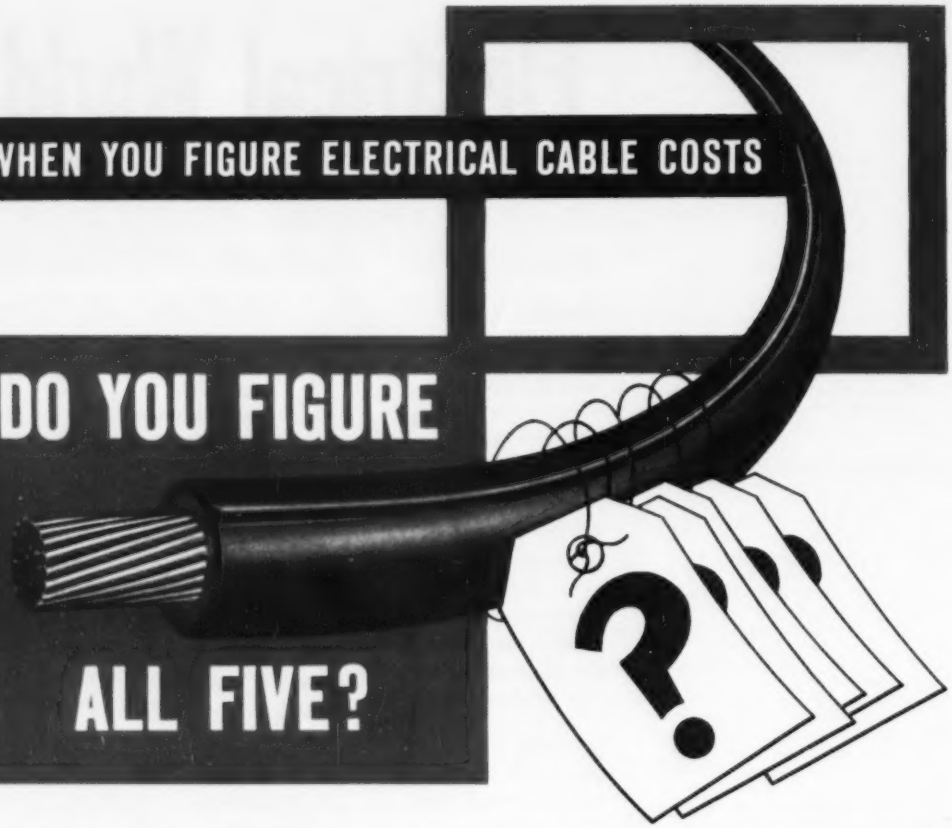
WHEN YOU FIGURE ELECTRICAL CABLE COSTS

DO YOU FIGURE



ALL FIVE?

All too often electrical cables are purchased solely on the basis of initial cost. Actually, of course, this is only one of five factors to consider . . . and no true cost comparison can be made until the four "hidden" costs are figured.

Here are the four "hidden" costs which often upset your overall budget, particularly when you're trying to "economize":

- **installation costs**
- **maintenance costs**
- **costs of power shutdowns when a cable fails**
- **costs of replacing a cable which has failed prematurely.**

Okonite cables are the most effective means for combating these costs. A wide range of Okonite cable designs assures you of the most economical installation for any type of operating condition. And for savings throughout the life of the cable, Okonite always uses the premium materials and exclusive processing techniques which deliver unfailing electrical service year in and year out.

We can't condense millions of man-hours of cable research, field engineering and manufacturing experience into a short description of Okonite cables. But your Okonite representative can show you in black and white why the best cables – Okonite cables – really carry the lowest overall cost. The Okonite Company, Passaic, N. J.

The best cable is your best policy

OKONITE SINCE 1878 ***insulated wires and cables***

Look for methods that help beat shortages — Graybar has tailored its services specifically to meet the particular requirements of the power and light industry.

You'll find that – if you order ahead – you can still expect the same efficient, co-operative service you have *always* received from Graybar.

Modern inventory methods plus our nation-wide network of over 100 offices and warehouses provides a system that helps reduce the possibility of local shortages . . . helps you get materials *when* and *where* you need them.

Look behind the Graybar tag

Look for specialized planning aid — Through years of specialized service, Graybar has developed an intimate understanding of the problems of utilities like yours.

That's why you can count on your local Graybar office to provide prompt, up-to-the-minute product information on both everyday and emergency needs.

In addition, your Graybar Representative and – at nineteen strategic locations – a Graybar Outside Construction Specialist are always on call to work with you in solving unusual problems.

Look for materials that are right for the job — From near-by Graybar you can fill all of your electrical requirements via a single transaction – and be sure you're getting dependable items.

You save the time and expense of multiple orders . . . you always get the products of leading manufacturers. 215-95

GRAYBAR ELECTRIC COMPANY, INC.
Executive Offices:
Graybar Building, New York 17, N. Y.

Call Graybar first for...

Graybar Everything Electrical
IN OVER 100 PRINCIPAL CITIES

FROM A FEW FEET OF CABLE

TO MONUMENTAL JOBS—

YOU CAN DEPEND ON TRIANGLE

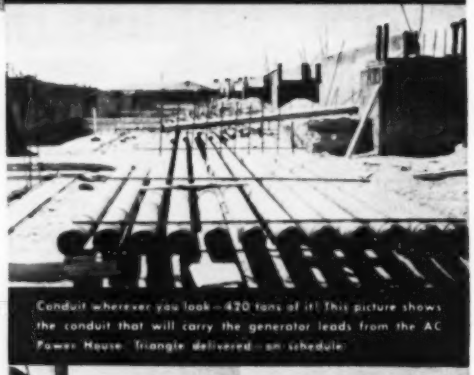
Jerome Fischbach, Vice-President of Fischbach and Moore, Electrical Contractors, says: "You can depend on Triangle. Things would have been tough without them."

The Reynolds Metals Co. new plant, Corpus Christi, consists of three Power Houses, four Reduction Pot Buildings and numerous auxiliaries. Pictured is one of the Power Houses.

Whether you buy cable and conduit over the distributor's counter or order material in car load lots—you can depend on Triangle. You can depend on Triangle from two very important angles—**quality** and **service.**

Take the monumental job pictured. Its the new Reynolds Metals Company plant being erected in Corpus Christi, Texas, for the manufacture of aluminum Pigs and Ingots. Its completion in a hurry is important to our defense program. The Electrical Contractor, Fischbach and Moore, Inc., New York, had 1000 men working on the project at its peak! Over 1½ million feet of wire and 420 tons of conduit were used! Of those amounts, Triangle furnished over 60%.

ON SCHEDULE—that's what counted on this important job! Jerome Fischbach, Vice-President of Fischbach and Moore has this to say about Triangle's *dependability*. "Triangle came through on schedule right down the line. Believe me, things would have been tough without them and that goes for all the other jobs they've helped us on."



Conduit wherever you look—420 tons of it! This picture shows the conduit that will carry the generator leads from the AC Power House. Triangle delivered—on schedule.

A group of Fischbach and Moore men work with Triangle conduit and cable on a control center prior to the erection of one of the buildings.

TRIANGLE

IT MUST BE RIGHT!

The Trade-mark of Top Quality

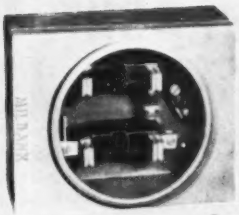
TRIANGLE CONDUIT & CABLE COMPANY, INC.

New Brunswick, New Jersey

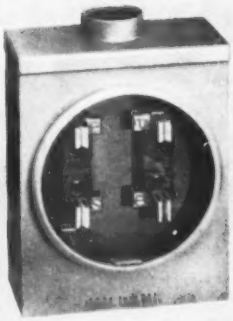
"Glazon" Building Wire • "Glazon" Non-Metallic Sheathed Cables • Control Wires • Armored Cable • Service Entrance, Service Drop • Varnished Cambric, Braided or Leaded • Trioprene Trench, Power and Parkway Cables • Bare Wire • Rigid Conduit Hot-Dipped Galvanized and Black Enameled • Electric Metallic Thin Wall Conduit • Flexible Steel Conduit.

IT'S MILBANK *in Standard Design*

Nearly 200 enclosures, including transformer housings, are available to fit virtually any requirement.



Cat. No. 39Z
INDOOR METER TROUGHS — Gangable Horizontal or Vertical.



Cat. No. L. C.
SOCKET METER TROUGHS — Also Furnished in Horizontal and Vertical Gangs.

IT'S ALWAYS MILBANK

FOR ENCLOSURES of DETAILED QUALITY

Yes, when it comes to enclosures that must withstand wear, weather or tampering—*you can bank on Milbank.*

If the need is for enclosures that offer installation short cuts and easier access—*it's Milbank for economy features.*

If it's an enclosure that must meet higher than average specifications—it's always to be found in *the complete MILBANK line.*

- ★ ALWAYS ADEQUATE WIRING SPACE
- ★ ALWAYS EASY ACCESS
- ★ ALWAYS ADEQUATE COPPER
- ★ ALWAYS COMPLETE TO THE SMALLEST DETAIL

Cat. No. 67x15
6"D - 7½"W - 15"H
SINGLE PHASE METER ENCLOSURE

IT'S MILBANK *in Custom Design*

Milbank's engineering department is available at all times for consultation and special job designs.

IT'S MILBANK *for manufacturing to your Specifications*

Whether a large or small installation, Milbank is prepared to furnish prompt detailed estimates.

Cat. No. A-376
3"D - 7"W - 6"H
METER CONNECTION BOX

Cat. No. 37x10
3"D - 7½"W - 10"H
INDOOR METER CONNECTION BOX

MILBANK
Manufacturing Co.

411 W. 10th St., KANSAS CITY, MO. KOKOMO, IND.

CATALOG FURNISHED UPON LETTERHEAD REQUEST

FOR OVER 38 YEARS THE ELECTRICAL INDUSTRY HAS COME TO *BANK ON MILBANK!*

PROMPT DELIVERY FROM 2 FACTORIES

Let it rain - Let it pour - High Moisture

This is typical of the experiences of RILEY "50" pulverizer users

"The mills and feeders are performing in a very satisfactory manner. We had a twenty-four hour rain and the coal was so wet, water ran back on the belts to the bunkers. We had considerable trouble with some of our mills, the Riley's didn't seem to notice there was anything different about the coal. The test you ran here may not have been conclusive but after what we went through I believe you can quit thinking about moisture. It seems to have no effect upon your equipment."

An unsolicited letter from a large Midwest Public Utility

TRADE MARK Rx REGISTERED

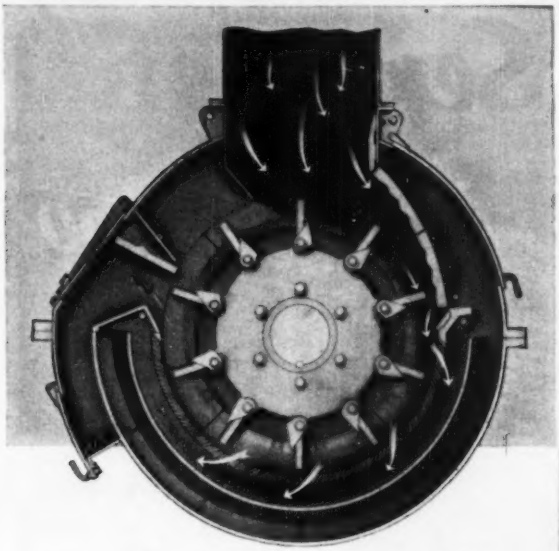
RILEY

STOKER CORPORATION, WORCESTER, MASS.

Boston · New York · Philadelphia · Washington · Buffalo · Pittsburgh · Cleveland · Detroit · Chicago
Cincinnati · Charlotte · Atlanta · New Orleans · St. Louis · Kansas City · St. Paul · Tulsa · Houston
Denver · Salt Lake City · Los Angeles · Portland · Seattle

BOILERS · PULVERIZERS · BURNERS · STOKERS · SUPERHEATERS · FLUE GAS SCRUBBERS

makes no difference to RILEY "50" Pulverizers



Crusher-Dryer Section

The crusher-dryer section, the first stage of the new Riley "50" pulverizer evaporates all free moisture in the coal if adequate primary air temperatures are provided so that moisture has no effect upon capacity or power consumption.

The crusher-dryer section not only dries the coal but it also rejects all foreign materials and crushes the coal to a fine granular state—at least 40% will pass a 50-mesh screen. This section also eliminates possibility of damage to the pulverizer by foreign materials as no material larger than ¼" can enter the final pulverizing stage.

Parts faced with tungsten carbides

To minimize maintenance and to assure long periods of continuous operation with sustained fineness, pulverizing elements are faced with tungsten carbide. A six-ton per hour Riley pulverizer equipped with tungsten carbide parts in September 1948 has pulverized over 80,000 tons of coal with no falling off of fineness and with but slight wear of tungsten carbide facing. See illustration of new and used parts at right. The use of tungsten carbide has greatly reduced maintenance material costs and tremendously reduced maintenance labor costs.

Riley "50" Pulverizers give you all these other significant advantages . . . .

- Quiet vibrationless operation
- Explosion proof
- Flexibility—wide load range
- Ability to carry extremely low loads
- Low power consumption
- Ease of regulation
- Small space required
- Minimum foundation cost
- Parts easily renewed
- Can be operated without coal feed
- Ease of ignition
- Low lubrication cost
- No worms or gears—just two bearings
- High primary air temperatures

The Riley "50" pulverizer is the latest development in the coal pulverizing field. It will pay you to thoroughly investigate this significant pulverizer development when considering additional coal pulverizing equipment.

A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large savings in your power costs

COMPLETE STEAM GENERATING UNITS

. . . it will pay you to visit modern Riley Installations before purchasing Boiler or Fuel Burning Equipment

ECONOMIZERS • WATER-COOLED FURNACES • STEEL-CLAD INSULATED SETTINGS • AIR HEATERS

Announcing the New Burroughs Sensimatic

Series 300

Latest, most versatile of the revolutionary Sensimatic Accounting Machines

Here is an amazing new model of a business tool that meets squarely the need of business today to get more things done in less time. On every count—*speed, flexibility, ease of operation, range of application, dependability and price*—the Burroughs Sensimatic 300 can stand the most critical comparison.

Because the Sensimatic 300 remembers as many as *11 different* figure totals at once, it's equipped to handle the most complex accounting operation facing your business. Yet this machine is so amazingly versatile that it will handle even the simple applications profitably. It's ready for *any* job at the turn of the job selector knob. And, with all its exclusive features, the Sensimatic is compact, easy to operate, and economical to buy.

Call your Burroughs man today. Ask to see a demonstration of the superb Burroughs Sensimatic 300. You'll find the Burroughs office nearest you listed in the yellow pages of your telephone book. Burroughs Adding Machine Company, Detroit 32, Michigan.

WHEREVER THERE'S BUSINESS THERE'S

Burroughs

Why the Sensimatic is more versatile . . . The sense plate, or "mechanical brain" directs the Sensimatic *automatically* through every figuring operation and carriage movement. One sense plate will control any four accounting operations—and with a turn of the job-selector knob the Sensimatic moves immediately into the next posting operation. Any number of sense plates can be used—so there's no limit to the number of accounting jobs the Sensimatic will do.

Why the Sensimatic is faster... Engineered for fast, *continuous* operation, the Sensimatic posts faster because it computes *while in motion*. The direct drive mechanism of the Sensimatic starts its automatic functions more quickly and surely—eliminates waste motion. And he operator has less to do.

Why the Sensimatic is easier to operate... Every operator function has been simplified to require minimum effort. Forms are easily and quickly inserted and aligned —and the work is completely visible. After a brief period of instruction anyone can operate a Sensimatic.

Why the Sensimatic costs less... Burroughs know-how has cut costs through ingenious simplification of moving parts, and compact design. Sensimatics are priced hundreds of dollars less than you might expect to pay for such widely useful machines.

2 other great Sensimatics to help America get things done!

Series 100 — Sensimatic 180 with 2 totals

Series 200 — Sensimatic 280 with 5 totals

can't rattle!

L-M's new GUY WIRE PROTECTOR

clamps guys firmly

1. Good tight anti-rattle hooks grip any strand from ¼" to ½" firmly and permanently.

2. Body is 18-gauge steel, heavily L-M-hot-dip galvanized to assure long-lasting protection.

3. Rounded edges add rigidity and safety. No rough edges to cut hands or snag clothes.

4. Long 30-inch cutaway at bottom permits putting the protector over anchor rod and two 6-inch clamps—a unique L-M feature.

5. Bottom clamp conveniently tightened with bolt on the side of protector. Grips any size from ¼" strand to 1" anchor rod. No loose parts to fall out.

can't twist!

L-M guy wire protectors offer extra features for safety and savings. Large size, fully rounded design, and bright L-M galvanizing assure high visibility. Design speeds up the installation. Generous, easily accessible clamping assures a firm grip — it's almost impossible for the protector to rotate. In 7′ and 8′ lengths.

LM

74

LINE MATERIAL

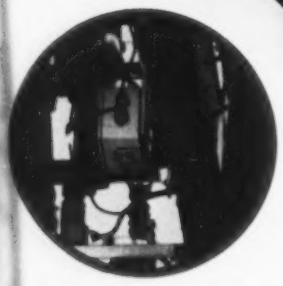
Line Construction Materials

Complete Coordinated Equipment for All Distribution Requirements

FOR FULL INFORMATION on these and other L-M Line Construction Materials, ask the L-M Field Engineer—or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).

All in ONE NEAT PACKAGE Ready to install!

LESS THAN $5.70 PER KVAR IN 300 KVAR SIZE, INCLUDING SWITCHES! AND CONSIDER THE SAVINGS IN INSTALLATION TIME AND MAN-HOURS!



Terminal box for control wiring, readily accessible from the pole. Upper photo shows two 225 kvar switched racks being hooked up.

Hang it up . . . hook it up . . . and the job is done! That's how you make your *first* savings, in time and labor.

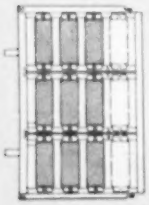
Then you *go on saving*, because this is a low-cost switching arrangement. It reduces the number of substation installations. You can put L-M Capacitor Assemblies farther out on the line, where they will do the most good. They are available in 225 and 300 kvar, switched or unswitched.

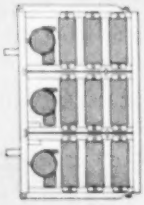
These packaged assemblies come completely crated and padded. No damage to painted surfaces; no maintenance painting after installation. To install, merely remove four bolts to release assembly from skid. A handy lifting yoke is available without charge.

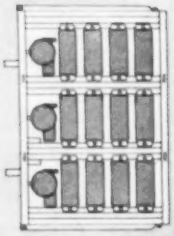
All Components Are L-M Manufactured

SWITCHES are L-M's standard heavy-duty Kyle type GR, for remote control, rated 100 amperes at 15 kv. *TERMINAL BOX* has removable cover making it easy to connect control cable before rack is removed from skid, or after mounting. *RACK* is heavy angle steel, with high factor of safety in its rugged design. Every *ELEMEX CAPACITOR* and component individually tested, as is the completed assembly . . . *at the factory*. *CONTROLS* not included, but fully automatic control may be provided with L-M's Voltage Sensitive Control.

Manufactured in these 3 assemblies







5 kv Racks: up to 225 kvar Switched; 225 or 300 kvar Unswitched

2.4 to 15 kv Rack: up to 300 kvar Switched

GET THESE BULLETINS

Your L-M Field Engineer will gladly supply complete information and bulletins; or write Capacitor Division, Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LINE MATERIAL Elemex Capacitors

Complete Coordinated Equipment for Distribution Today

73-2

the Performance of ELEMEX Capacitors Proves it!

When L-M engineers started designing capacitors, about ten years ago, they worked closeiy with utility engineers to learn what customers needed in capacitor design and performance. ELEMEX capacitors were *designed* to meet customers' needs. Now ELEMEX capacitors have been improved to serve those needs even better. Here are some of the features—some of the "extras" that ELEMEX capacitors give you!

1. **Longer Life:** low insulation unit stress on the pack—the heart of the capacitor.

2. **Stronger solder-sealed bushings.** It takes about 1900 pounds to force an L-M bushing out of the cover. Bushings are tested 100%—*every* bushing!

3. **Pure aluminum electrodes**—not just tinned copper.

4. **Easy installation**—with uniform terminal height above mounting flanges; "Paragroove" connectors simplify hookup.

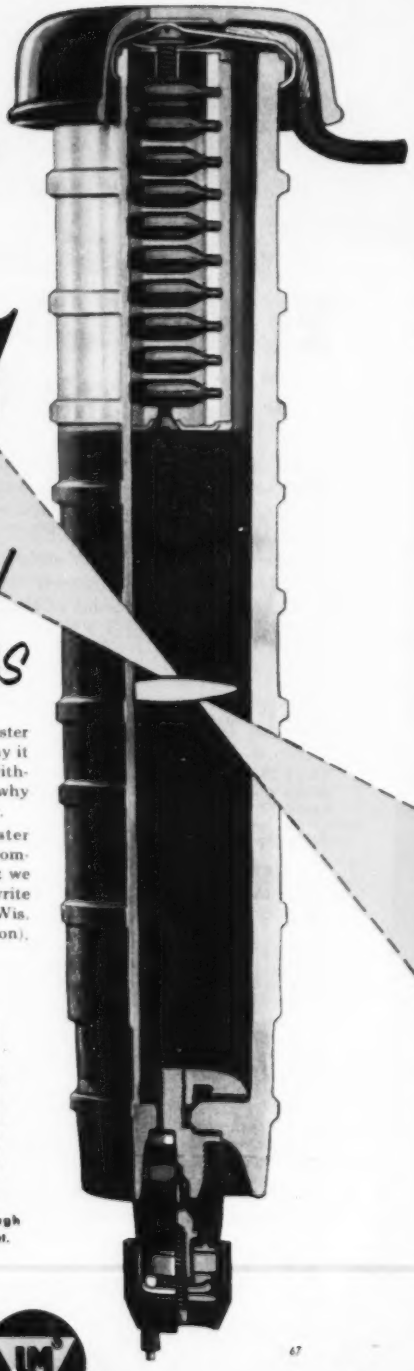
5. **Low-cost maintenance:** L-M introduced stainless steel tanks, will continue to produce them as long as possible. Mild steel tanks have *three* coats of enamel *baked on* individually, not just one or two spray coats.

6. **Streamlined tanks,** with rounded corners for appearance and maximum resistance to corrosion. (Important in painted mild steel units).

7. **Convenient packaging,** in wood-reinforced cartons with protection at friction points. Cartons stamped sides and top; unit remains in the carton from finishing bench to the pole.

8. **Simple, efficient switching** for small or large capacitor banks. Another L-M extra.

the only lightning arrester with the LENS that gives it such high discharge capacity and unchanging characteristics



An ingeniously designed lens electrode is placed in the valve element of *every* L-M valve type arrester. This exclusive L-M feature performs an extremely valuable function that accounts for the exceptional performance and long life of L-M arresters.

Here's why. Lightning surge current tends to "skin" down the outside of the valve element, just as 60-cycle current will flow on the skin of a conductor. This results in only a small portion of the valve element being used to handle lightning surges. Thus the surge capacity of what might be a good arrester is materially lowered—the valve element will fail in time due to the excessive concentration of current on the outer skin.

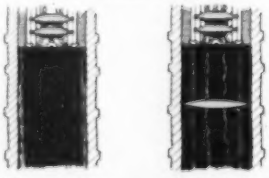
The L-M lens electrode completely counteracts lightning surge current "skin effect." The full cross-section of the valve element is available for extremely high surges—considerably in excess of 65,000 amperes.

The lens does the job. It distributes the surge evenly throughout the valve element—doesn't allow it to concentrate in any one path and thus clinker the element.

That's one reason why an L-M arrester can take more and heavier surges—why it maintains its high discharge capacity without change, for years and years . . . why its rate of failure is so gratifyingly low.

Get the whole story on L-M arrester performance, including some utility company records which substantiate what we say. Ask the L-M Field Engineer, or write Line Material Co., Milwaukee 1, Wis. (a McGraw Electric Company Division).

Here's What Happens



Without LENS
Surge channels down sides of element.

With LENS
Surge goes through the entire element.

LINE MATERIAL
Lightning Arresters

Complete Coordinated Equipment for Distribution Today

NEW! EXCLUSIVE!
L-M's 7.5 KV "FAMILY"
of cutouts with interchangeable doors!

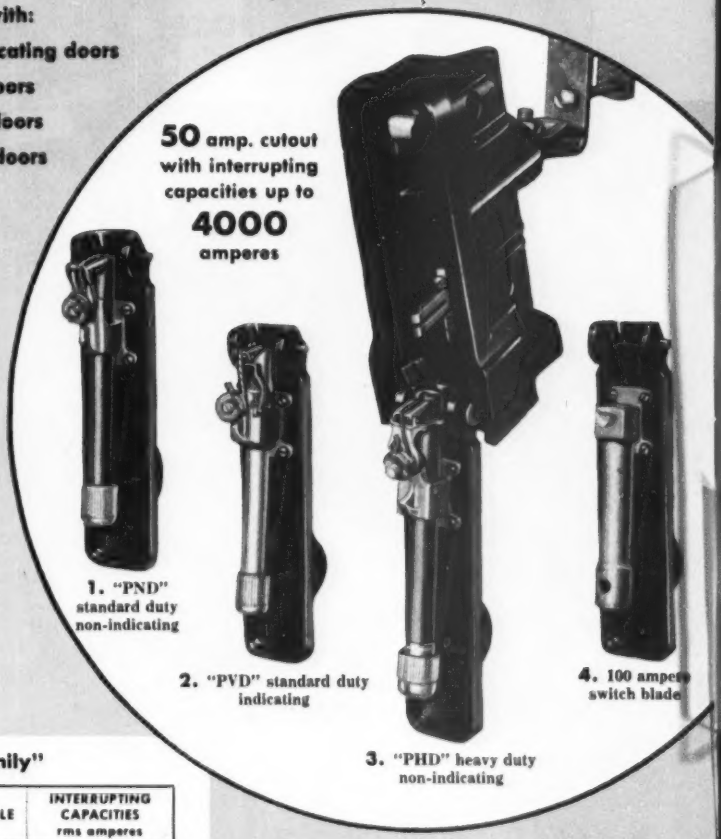
50 and 100 ampere cutouts, each with:
new "PND" standard duty non-indicating doors
"PVD"® standard duty indicating doors
"PHD" heavy duty non-indicating doors
100 and 200 ampere switch blade doors

Here's another L-M "first"! The new 7500-volt family of 50 and 100 ampere cutouts, each with four interchangeable doors to meet a wide variety of services. As operating requirements change, you simply change a door—in 6 seconds the job is done! Saves warehousing, saves installation time, saves in operation.

Safer, too. Doors are removed or hooked on, all with the switch stick. When door is open, all parts are dead.

GET THE WHOLE STORY

Ask the L-M Field Engineer for details on L-M's new "first families" —the 7500-volt family shown here, *and L-M's new 5000-volt family*, also! Or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).


50 amp. cutout with interrupting capacities up to 4000 amperes
1. "PND" standard duty non-indicating
2. "PVD" standard duty indicating
3. "PHD" heavy duty non-indicating
4. 100 ampere switch blade

L-M's new 7.5 kv "Family"

RATING		INTERCHANGEABLE DOORS AVAILABLE	INTERRUPTING CAPACITIES rms amperes
50 AMPERES	1.	"PND" standard duty non-indicating	1200 amperes
	2.	"PVD" standard duty indicating	1200
	3.	"PHD" heavy duty non-indicating	4000
	4.	Switch Blade	100 amperes continuous current rating
100 AMPERES	5.	"PND" standard duty non-indicating	3000 amperes
	6.	"PVD" standard duty indicating	3000
	7.	"PHD" heavy duty non-indicating	8000*
	8.	Switch Blade	200 amperes continuous current rating

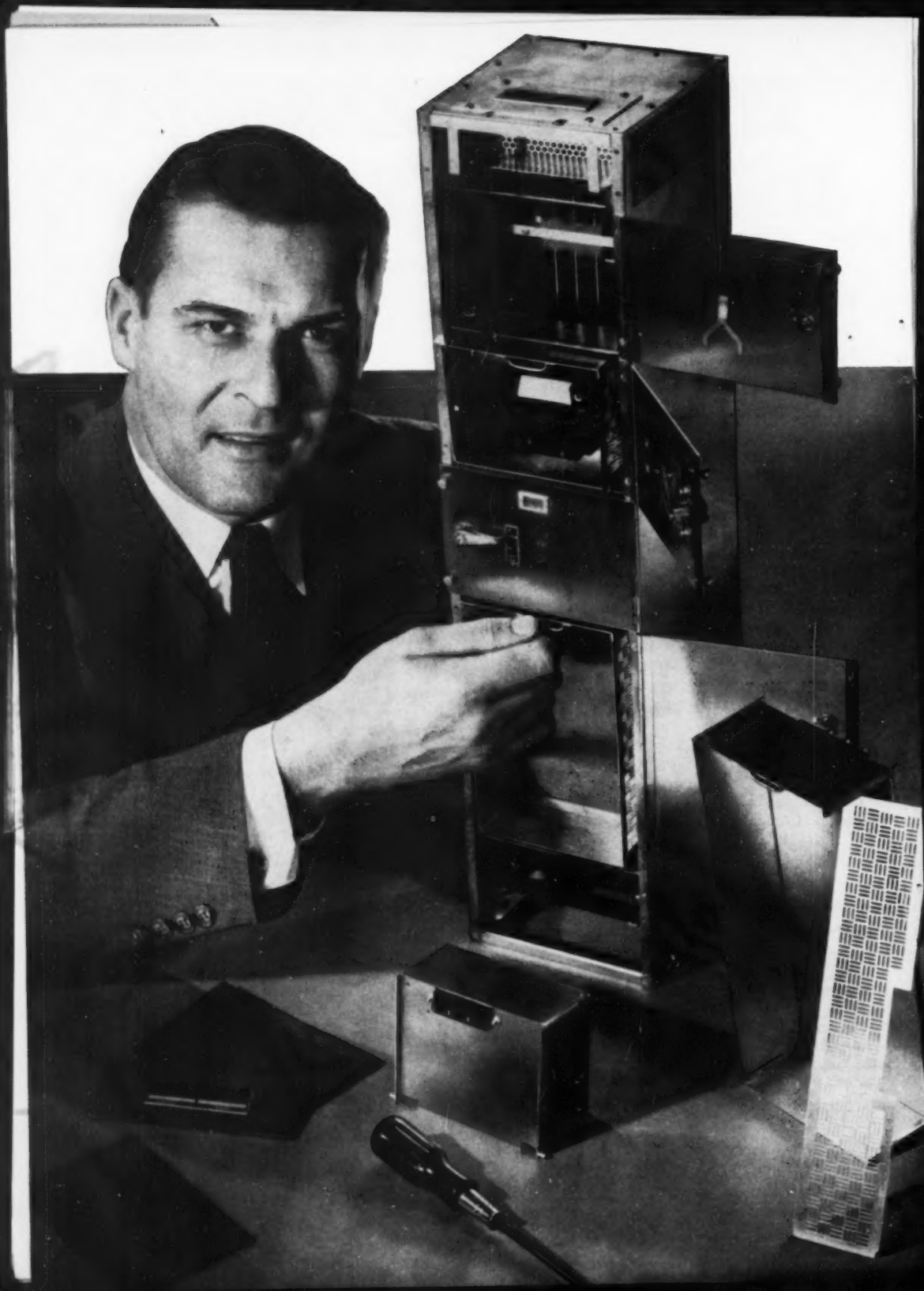
"PND", "PVD", AND "PHD" are L-M Trademarks *Available soon

100 amp. cutout with interrupting capacities up to 8000 amperes

5. "PND" standard duty non-indicating
6. "PVD" standard duty indicating
7. "PHD" heavy duty non-indicating
8. 200 ampere switch blade

LINE MATERIAL
fuse cutouts

Complete Coordinated Equipment for Distribution Today



Here's why most control center buyers specify Westinghouse

Why this mass preference? It all boils down to matching product to need. Close co-operation with industry, exhaustive tests and constant improvement have produced this control center which matches industry's every need. Here are the product features that make Westinghouse Control Centers the MOST PREFERRED control centers:

FLEXIBILITY

Westinghouse Control Centers have complete flexibility to match the periodic movement, substitution and addition of machines—flexibility of electrical components—flexibility of structural units. All cubicle units are built to a standard 14″ module—are completely interchangeable. Vertical structures are standardized and free-standing—can be moved or added at any time.

EASIER SERVICING

There is no maze of mechanical obstacles on a Westinghouse Control Center. A few twists of a screw driver and your serviceman is ready to go to work. Guide rails simplify removal and insertion of cubicles. All starter units are front wired. Side baffles are removable for easier wiring. Sectional and master terminal boards speed hook-up work.

POSITIVE SAFETY

Westinghouse Control Centers protect *both* personnel and equipment. The Westinghouse "Magnagrip*" stab connectors and tilt-out disconnect position assure a "dead" unit for servicing. Unit door remains on structure to cover hot buses when starter unit is removed. Tested baffling prevents explosive chain reactions if faults occur. Each starter has an interrupting capacity of not less than 15,000 rms amps.

Complete details on these and other important features are contained in the Control Center Booklet B-4213. Ask for your free copy. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-27021

YOU CAN BE SURE...IF IT'S
Westinghouse
CONTROL CENTERS

WE'RE OLD HANDS AT THIS BUSINESS

Whenever you are in the market for transmission towers, here's something to keep in mind: Bethlehem is an old hand at tower design and fabrication, with more than fifty years of experience in this type of work.

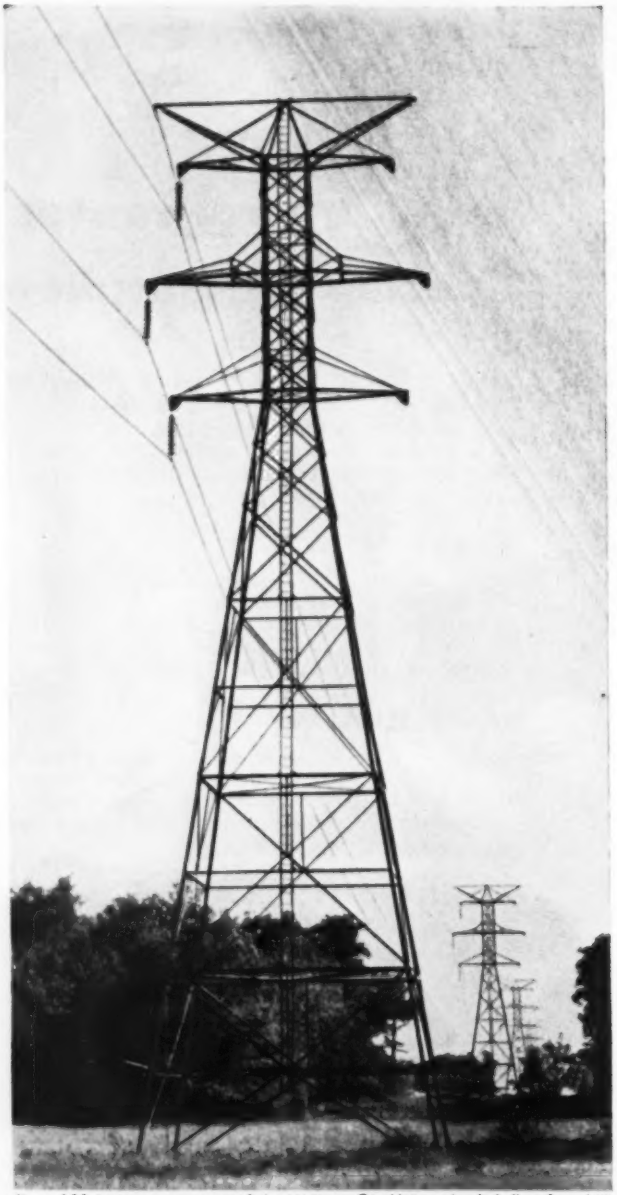
Bethlehem has designed and fabricated towers for service in all parts of the country, for all types of terrain, and for just about every conceivable load condition. Besides, our well-located shops are manned by skilled personnel, and are equipped for every phase of tower manufacture, including galvanizing.

The nearest Bethlehem office will be pleased to discuss transmission towers with you at any time.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

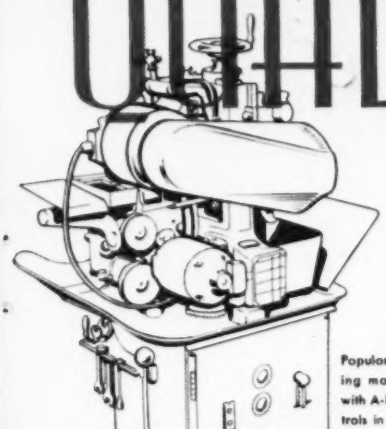
BETHLEHEM STEEL



These 132 kv towers are part of the Michigan City-Valparaiso, Ind., line, for which Bethlehem designed and fabricated over 100 towers for the Northern Indiana Public Service Co., Hammond, Ind. Towers are 114 ft, 6 in. high, have base width of 30 ft, 2 in., and are mounted on earth grillages. Height to lower crossarm, 81 ft, 6 in. Vertical separations, 13 ft. Conductors (6), 397,500 cm ACSR 30/7. Ground wires (2), 159,000 cm ACSR 12/7. Span, 1000 ft, 2 deg angle.

Transmission Towers

QUALITY CONTROL COMPONENTS



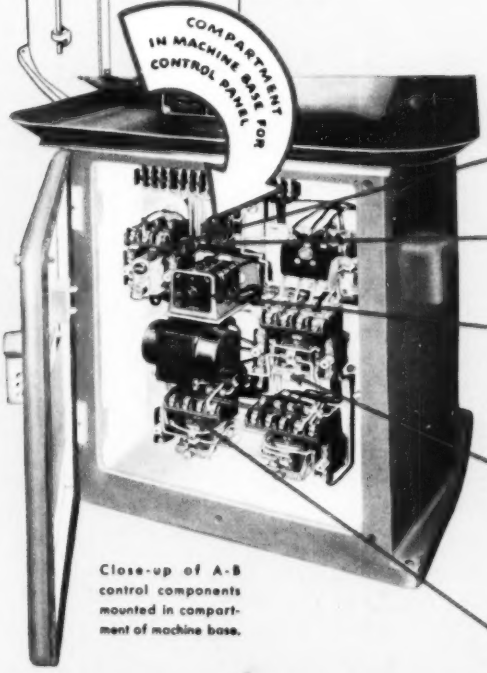
Popular milling machine with A-B controls in base.

If you design or manufacture motorized machinery, it will pay you to consider A-B controls.

These time-tested A-B control components are available in a wide variety of types and sizes. With these components, quickly selected from the A-B Handy Catalog, you can assemble control panels to provide the exact control sequence needed for maximum output.

If you have a new machine on your drawing boards, why not call in an Allen-Bradley control engineer. His advice may simplify your control design and improve your machine operation.

Allen-Bradley Controls are a Sales Asset to any Machine Tool



Close-up of A-B control components mounted in compartment of machine base.

MANUAL STARTERS
Bulletin 609 Manual Starters have quick make, quick break contacts and overload relays. In a variety of enclosures.

SELECTOR SWITCHES
Selector switches and oiltight push buttons.

DRUM SWITCHES
Drum Switches for pilot control service, reversing operation, and multi-speed motor control. Furnished in enclosures.

COMBINATION STARTERS WITH DISCONNECT UNITS
These Bulletin 712 Combination Starters have a manually operated disconnect unit and a magnetic starter switch with overload relays on a single mounting plate. Can also be furnished with circuit breaker.

MAGNETIC SWITCH
The A-B line of Bulletin 709 Solenoid Starters are available in 7 sizes, 1 to 300 hp, 220 v; 600 hp, 440-550 v. All have double break, silver alloy contacts and overload relays.

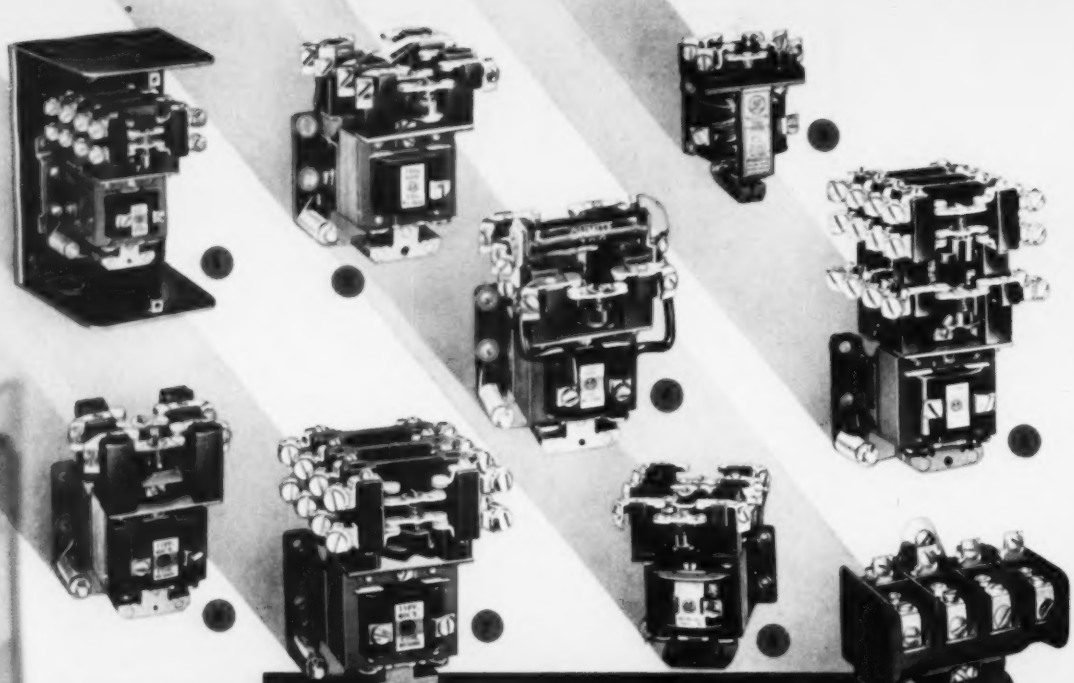
482-M

Follow the example of leading machine tool manufacturers by adding A-B controls as a sales asset to your motorized machines. Catalog will be gladly sent to you on request.
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wisconsin

ALLEN-BRADLEY

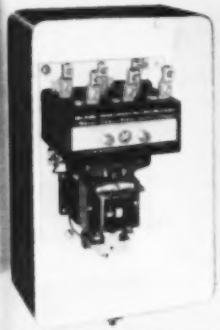
MOTOR CONTROL

A-B Quality

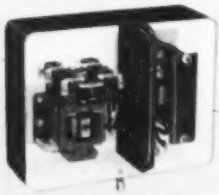


RELAYS and CONTACTORS

For A-C and D-C Automatic Control Panels



Fifty ampere 3-Pole Contactor in a general purpose Type I Enclosure.



Bulletin 700 Type BT Relay with a step-down control transformer.

Do you need small relays from one to 8 poles . . . or contactors up to 900 amperes? Do you want hum-free contactors? You will find all of these units, and more, too, in the Allen-Bradley line . . . factory tested . . . ready to install . . . and good for millions of maintenance-free operations.

Type BX universal relays have interchangeable normally open and normally closed contacts. No reassembling needed to change contacts.

A few of the many relays in the Allen-Bradley line are illustrated above.

- Type BX Universal A-C Relay—in Enclosure
- Type BM Mechanically Held Relay—No Hum
- Type CL Low Coil Current Relay
- Type BA 3-Wire Thermostat Relay—Open
- Type BX 8-Pole Universal Relay—Open
- Type B 2-Pole A-C Relay—Open
- Type BX Universal A-C Relay—Open
- Type BM Mechanically Held Relay—Open
- Bulletin 202 2-Pole D-C 25-Ampere Relay

Write for Bulletins 700 and 200.

Allen-Bradley Co., 1316 South Second Street, Milwaukee 4, Wisconsin

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

A-B Quality

452-M

in *ANY* LABORATORY or SHOP

this Universal Bridge is Invaluable

for Measurements of

INDUCTANCE — *1 microhenry to 100 henrys*

RESISTANCE — *1 milliohm to 1 megohm*

CAPACITANCE — *1 micromicrofarad to 100 microfarads*

STORAGE FACTOR (X/R) — *.02 to 1000*

DISSIPATION FACTOR (R/X) — *.002 to 1*

The G-R Type 650-A Impedance Bridge will measure the inductance and storage factor of coils, the capacitance and dissipation factor of capacitors and the a-c and d-c resistance of all types of resistors, over extremely wide ranges.

It is completely self-contained, portable and always ready to operate; batteries and all standards are built in. The only accessory not supplied is a pair of head telephones for a-c measurements.

Both a-c and d-c measurements can be made. Four dry cells provide the d-c power, with a zero-center galvanometer as the null detector. An enclosed 1-kc hummer is used as the a-c power source. For operation from a few cycles to 10 kilocycles an external generator may be connected to panel terminals.

This bridge is an extremely versatile instrument. Its ease and rapidity of operation, wide range, flexibility and accuracy have made it the standby of thousands of users the world over.

It is as useful in the shop in routine testing, fault locations, and identification of unlabeled components as it is for measurement of bread-board circuit constants in the design stage. The direct-reading feature permits rapid readings of component values, eliminating the time and trouble of calculations. Accuracy is sufficient for most laboratory measurements (1 to 2% over most of the range).

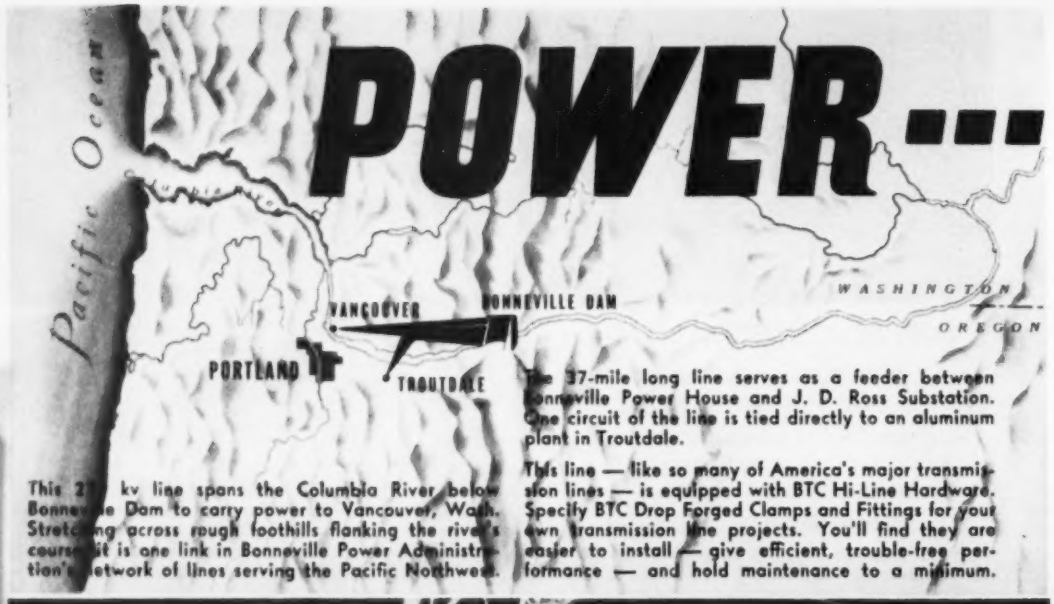
This instrument is a tool no electrical laboratory or manufacturer can afford to be without.

TYPE 650-A — Impedance Bridge: $260

GENERAL RADIO Company

275 Massachusetts Avenue, Cambridge 39, Massachusetts

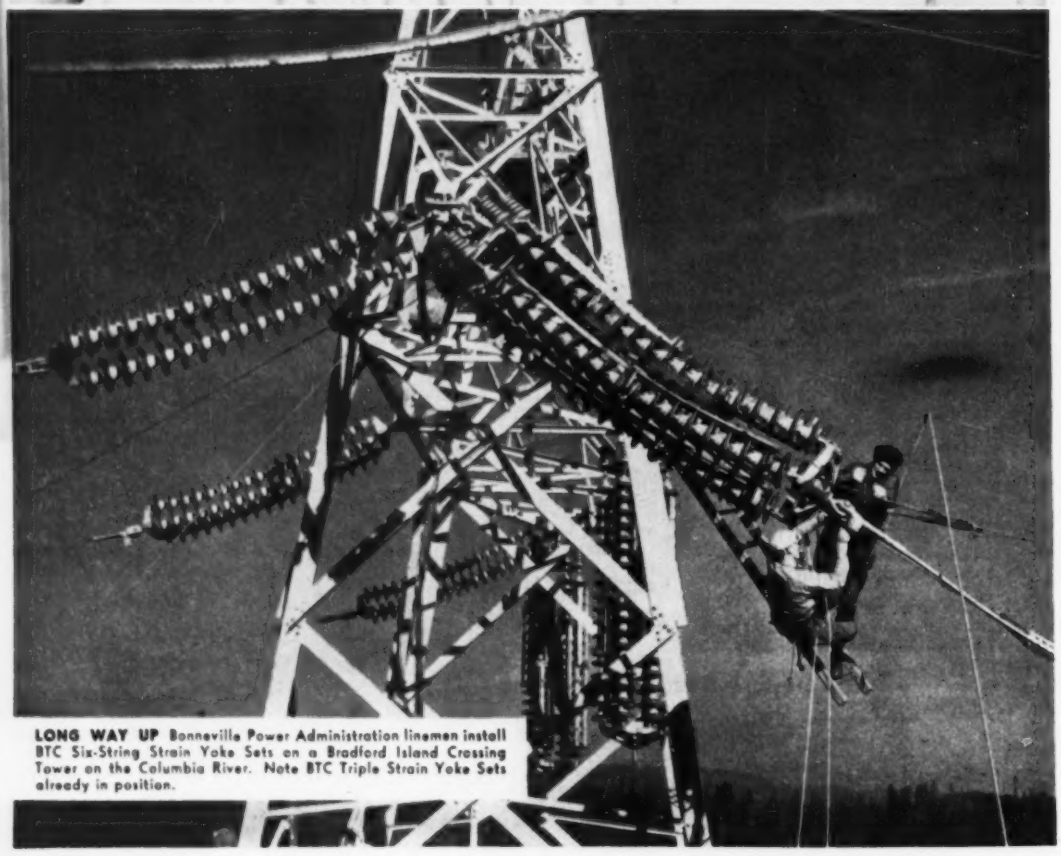
POWER...



This 27[illegible] kv line spans the Columbia River below Bonne[illegible]e Dam to carry power to Vancouver, Wash. Stretching across rough foothills flanking the river's course, it is one link in Bonneville Power Administration's network of lines serving the Pacific Northwest.

The 37-mile long line serves as a feeder between Bonneville Power House and J. D. Ross Substation. One circuit of the line is tied directly to an aluminum plant in Troutdale.

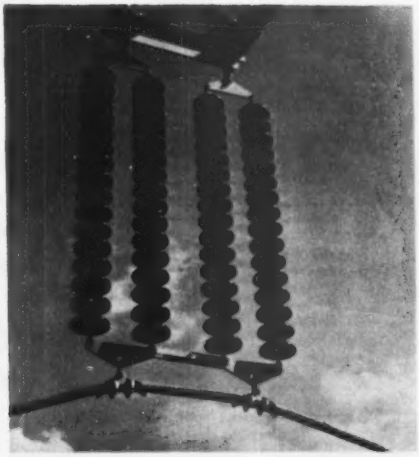
This line — like so many of America's major transmission lines — is equipped with BTC Hi-Line Hardware. Specify BTC Drop Forged Clamps and Fittings for your own transmission line projects. You'll find they are easier to install — give efficient, trouble-free performance — and hold maintenance to a minimum.



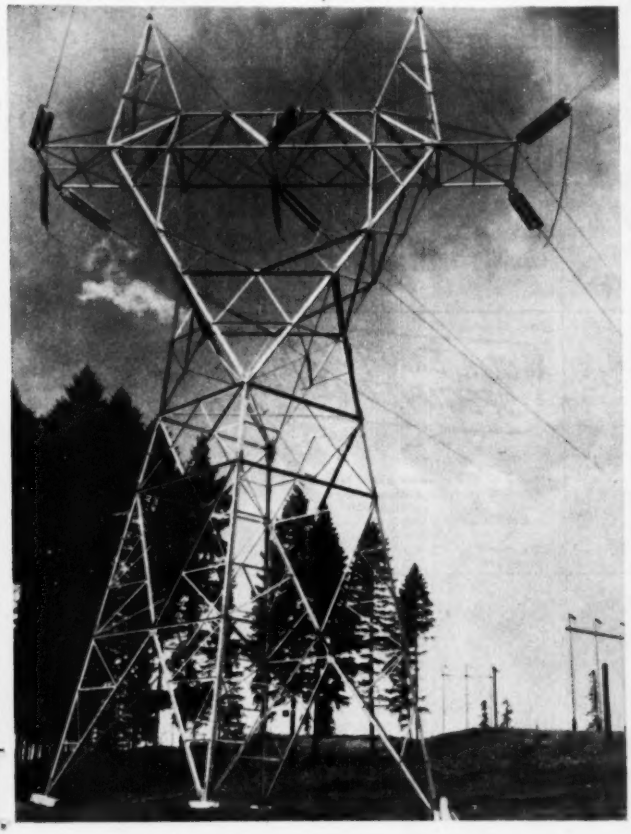
LONG WAY UP Bonneville Power Administration linemen install BTC Six-String Strain Yoke Sets on a Bradford Island Crossing Tower on the Columbia River. Note BTC Triple Strain Yoke Sets already in position.

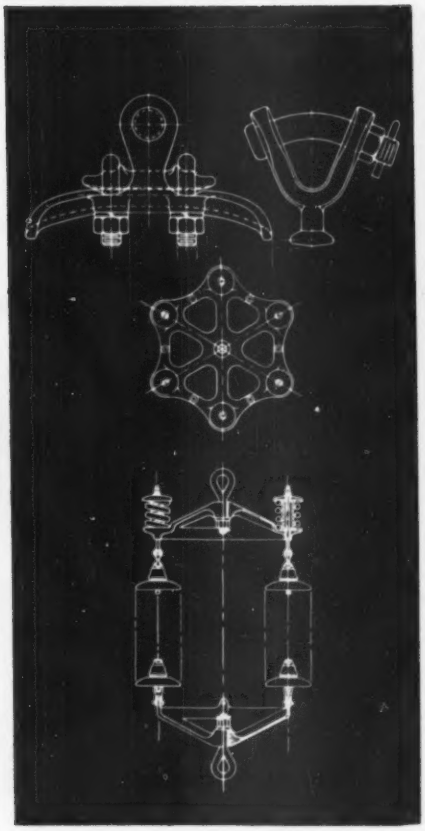
for the Pacific Northwest

BIRD'S EYE VIEW Two BTC Double Strain Yoke Sets with suspension clamps and stabilizer bar are installed on a Bradford Island Crossing Tower high above the Columbia River.



TYPICAL TOWER This single circuit angle dead-end tower is typical of those found along the 37-mile stretch between Bonneville and Vancouver. BTC Triple Strain Yoke Sets are used.





Sold Through Your Insulator Manufacturer Only

Drop Forged BTC Hi-Line Hardware

The **BREWER-TITCHENER** Corporation

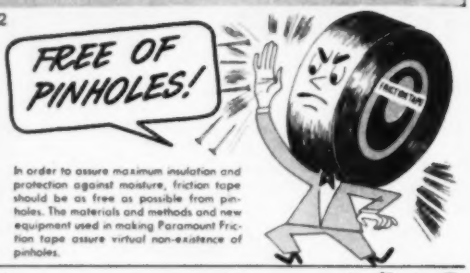
Cortland · New York

PARAMOUNT FRICTION TAPE by Haartz-Mason

1

Made under the most exacting requirements in the industry, Paramount Friction tape can be tightly wrapped — yet can be torn readily as required. A margin of safety in this respect is added to every roll of Paramount Friction tape.

2



In order to assure maximum insulation and protection against moisture, friction tape should be as free as possible from pinholes. The materials and methods and new equipment used in making Paramount Friction tape assure virtual non-existence of pinholes.

3

Automatically cut with smooth, neat edges on Cameron cutting machines. These machines wind it on the cores under tension. This is your insurance against ravelling.

4

Under controlled temperature and humidity, Paramount Friction tape is strictly tested for permanence of adhesion.

5

Taken from stock at regular intervals, sample rolls of Paramount Friction tape undergo accelerated aging tests in an electric oven at 212° F. for 16 hours. Thus you get a guarantee of maximum aging ability.

6

Every roll of Paramount Friction tape is sold with guaranteed minimum footage per roll plus . . . guaranteed weight. You are left in no doubt about what you are getting. And so you know you will cover the largest area most efficiently at the lowest cost.

7

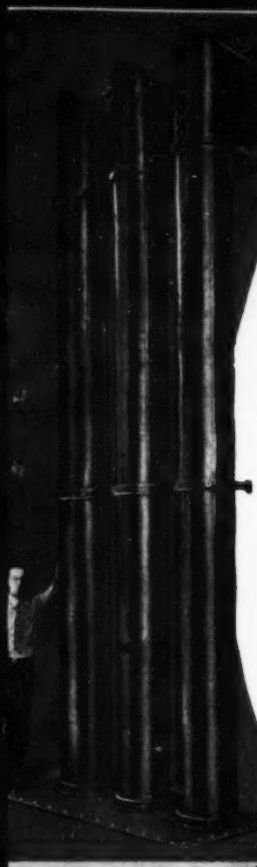
To sum up, Paramount Friction tape, besides being made of finest materials, also undergoes rigorous pre-testing at the factory. Among the rigidly conducted tests are those for aging, adhesion and strength.

Manufactured by

Haartz-Mason, Inc.

WATERTOWN 72, MASS.

Rice Leaders of the World Association



SIMPLE *or* **COMPLEX** *or* BOTH—

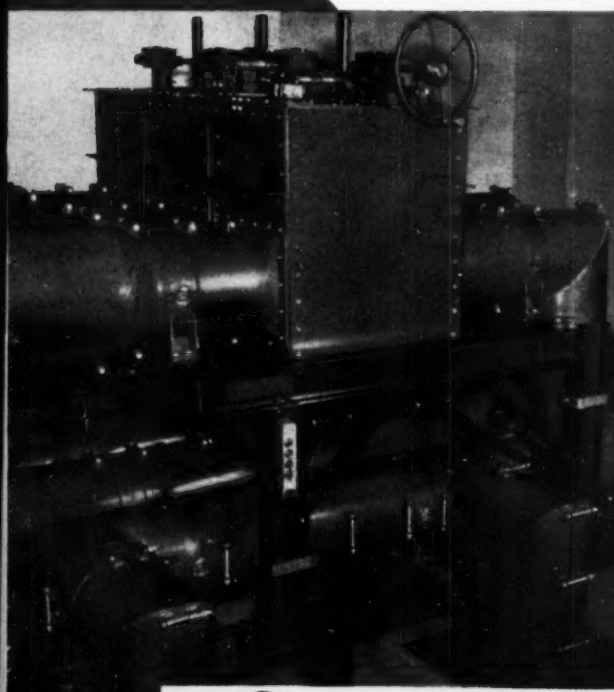
R&IE

ISOLATED PHASE, METAL ENCLOSED BUS STRUCTURES PROVIDE—

CHECK the FACTS

- highly reliable service
- reduction in maintenance
- complete factory fabrication
- all insulators in compression
- flexibility of arrangement
- extremely compact installation
- lower installation costs
- neat, trim appearance

Check all these advantages of isolated phase, metal enclosed bus structures against cable runs or cell structures. Then call in an R&IE engineer who will gladly discuss R&IE equipment for your installation.



Section of a 3500 Ampere Isolated Phase Bus. Note how the angular turns, side connections, direction reversal, together with a disconnecting switch are fitted into a compact space.

CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS

DISCONNECTING SWITCHES INDOOR AND OUTDOOR

HORN GAP SWITCHES

INTERRUPTER SWITCHES

CUTOUTS AND THERMO RUPTERS

DISTRIBUTION EQUIPMENT

SWITCH OPERATING MECHANISMS

SUBSTATIONS

OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES

KIRK INTERLOCK SYSTEMS

AUTOMATIC SWITCHING EQUIPMENT

METAL CUBICLES

TESTING DEVICES

R & I E EQUIPMENT DIVISION
I-T-E CIRCUIT BREAKER CO.
GREENSBURG, PA.

SERVICE CONTINUITY

ELIMINATES COSTLY PRODUCTION BREAKDOWNS

ISOLATES SYSTEM FAULTS

SAVES UP TO 63% ON INITIAL INVESTMENT

Direct-Acting Selective Overcurrent Trip Devices are available for I-T-E KA, KB, KC, and LG type circuit breakers in the following ratings:

15,000 to 100,000 amperes interrupting capacity

100 to 6000 amperes continuous

MODERN I-T-E DIRECT-ACTING SELECTIVE TRIP BREAKER PROTECTION

It's easy to protect production and profits against disastrous total power failure in complex electrical distribution systems. The cost is lower than you think.

Modern Selective Tripping—pioneered and developed by I-T-E—eliminates the failings of inadequate systems which can tie up an entire plant or utility with a single short somewhere along the line.

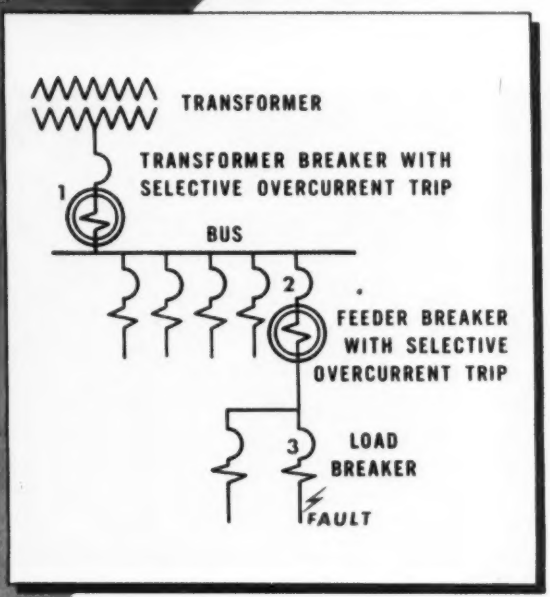
Selective Tripping limits the fault to *one* affected area only. Production continues—*uninterrupted*—throughout the rest of the system.

I-T-E TRIP DEVICE SAVES 63% ON INVESTMENT

Secret of this efficient delayed-action circuit breaker protection is the I-T-E *Direct-Acting* Selective Overcurrent Trip Device. Developed by I-T-E engineers to replace complex, expensive transformer-relay auxiliary apparatus, this unique tripping device gives one more reason for I-T-E leadership in the design and application of quality circuit breakers and switchgear.

Positive—compact—dependable, the low-cost I-T-E Trip Device saves you up to 63% on accessory cost per circuit! And because it is a *direct-acting* device—an integral part of the circuit breaker—no additional space is required on your switchboard panel. Assure service continuity. Install I-T-E Selective Tripping in *your* plant.

COSTS LESS THAN YOU THINK



HOW SELECTIVE TRIPPING WORKS

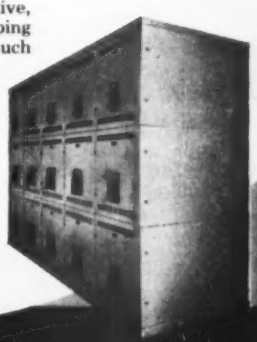
I-T-E circuit breakers, arranged in series, are *preset* to open in *definite sequence* (3, 2, 1 in diagram). If there is a sudden overcurrent or short circuit in any branch of the system, only the breaker (3) closest to the fault will open. Other breakers—other production machinery—in the system are unaffected.

ANOTHER I-T-E "FIRST"

Here is one more I-T-E "first"—another major I-T-E development to help industry protect production and save. Originally developed for the Navy during the War, the I-T-E Direct-Acting Selective Overcurrent Tripping Device has since been refined and perfected for industrial and utility use.

Call on I-T-E engineers—specialists in circuit breakers and switchgear—to see how positive, dependable I-T-E *Direct-Acting* Selective Tripping can protect your plant operation. See how much you can save.

For selection and application data on I-T-E large air circuit breakers, including selective tripping arrangements write for Catalog Section 1003 today. I-T-E Circuit Breaker Co., 19th and Hamilton Sts., Phila. 30, Pa.



I-T-E

LOW-VOLTAGE SWITCHGEAR

I-T-E CIRCUIT BREAKER CO. • 19TH AND HAMILTON STS. • PHILADELPHIA 30, PA.

CANADIAN MFG. AND SALES: EASTERN POWER DEVICES, LTD., TORONTO • EXPORT SALES: PHILIPS EXPORT CORP., N. Y. 17, N. Y.

✓ EVERY CIRCUIT BREAKER...

ALLIS-CHALMERS
METAL-CLAD
Switchgear

Built to

Switchgear framework is welded in a jig. This is first of many jigs used to make units interchangeable. In addition, all frame assembly is done on specially leveled factory floor to assure trueness.

Perfect alignment of all parts is assured by jigs. Master jig of removable element is shown inside stationary element. Operation of elevating mechanism also checked with this same jig.

ALLIS-CHALMERS

First in the U. S. with Metal-Clad Switchgear

✓EVERY STATIONARY ELEMENT...

Master Jigs!

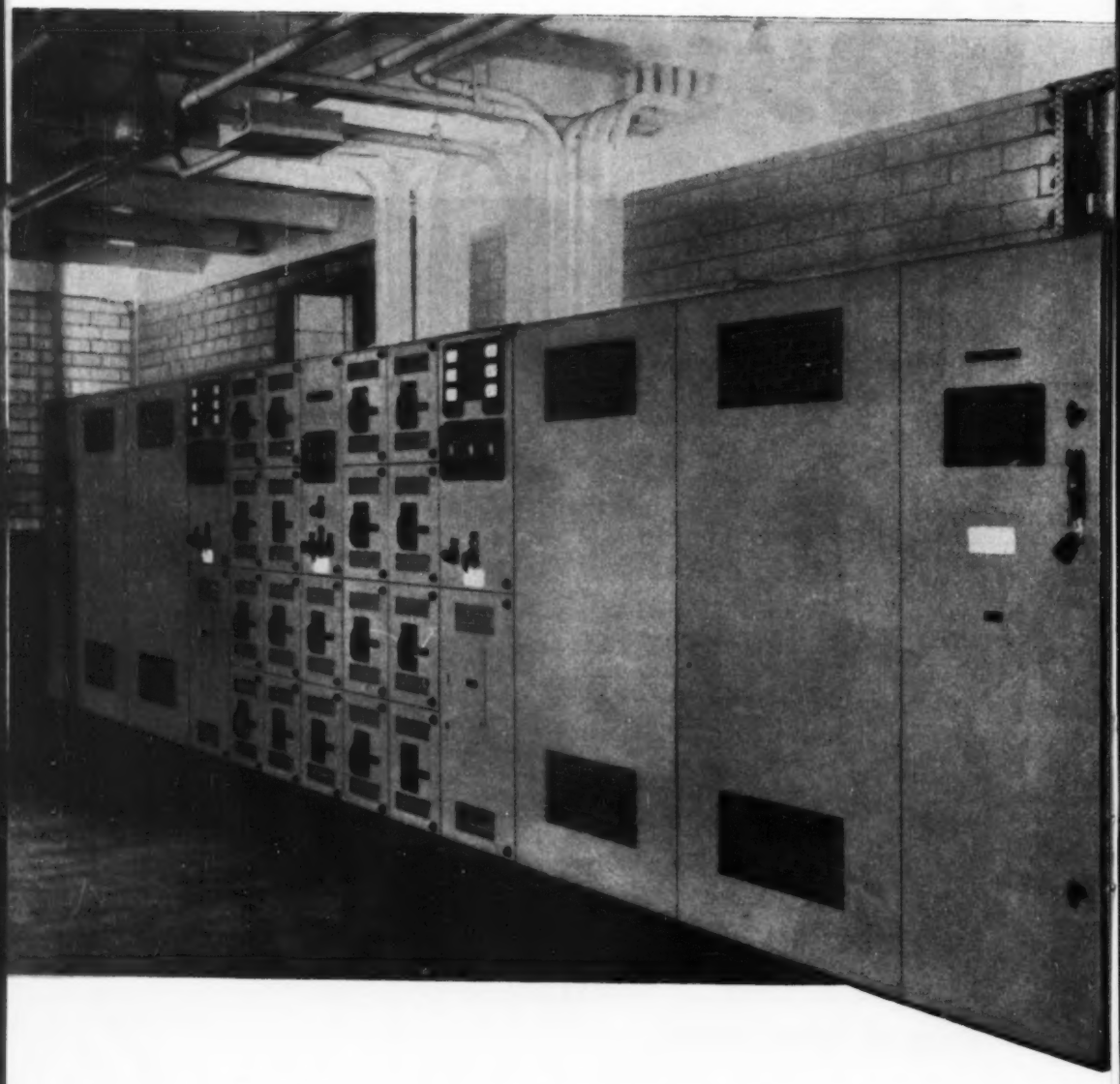
Removable element in turn is built to master jigs. Breaker bushing location is being checked to close tolerance by jig which indicates placement of bushing on stationary element.

A number of jigs are used in building the removable elements. Two are shown in circuit breaker assembly line. This care during manufacture pays off in ease of installation.

A-3720

Care Like This in Manufacture Adds Up to Fast, Easy Installation . . . Interchangeability Between Units of Same Rating.

THIS IS JUST one example of the care taken in manufacturing Allis-Chalmers switchgear. Every step in building, every detail of construction, receives this same careful attention. It will pay you to find out more about Allis-Chalmers switchgear. Call your nearby A-C District Office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.



Westinghouse *POWER CENTERS* provide for efficient power distribution at Eastman Kodak

Westinghouse Power Centers consisting of dry-type transformers and switchgear are serving the modern power distribution system at Eastman's Kodak Park Works at Rochester, N. Y. Here's how this user rates their performance in this key function.

> *"In recent years, a number of Westinghouse Power Centers have been installed at the Kodak Park Works. These units all have ASL dry-type transformers and are supplied at either 2,400 or 13,800 volts. Capacities range from 300 kva to 1,500 kva. Maintenance has been nominal and no serious trouble of any kind has been experienced. We are well satisfied with the equipment."*

Many specific advantages of Westinghouse Power Centers contribute to such approval of these installations. For example . . .

They cost less to maintain . . . no liquids to test, recondition or replace . . . no gaskets, valves or gauges. All parts are readily accessible.

They're more economical . . . because they eliminate the need for costly vaults and can be located near the center of load . . . resulting in shorter secondary circuits, lower line losses, better regulation.

They're safer . . . from the hazards of fire and explosion; they have no exposed live parts. Breakers and switches have positive interlocking mechanisms, each in its separate compartment.

GET THE COMPLETE STORY

Westinghouse Power Centers provide better service continuity, greater flexibility, better regulation . . . all the things that contribute to efficient power distribution. Most important, they provide the simplest, lowest-cost way of attaining the power system that best meets your operating requirements.

Booklet B-4162 covers Westinghouse Power Centers in detail. Booklet B-4045 discusses various types of plant distribution systems wherein power centers offer maximum advantage. Contact your Westinghouse Representative or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-60765

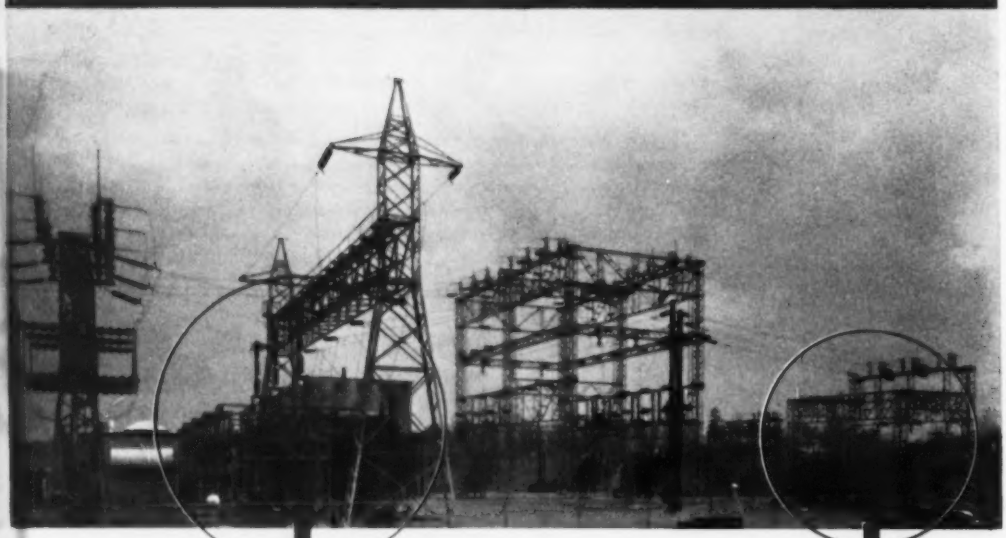
Westinghouse

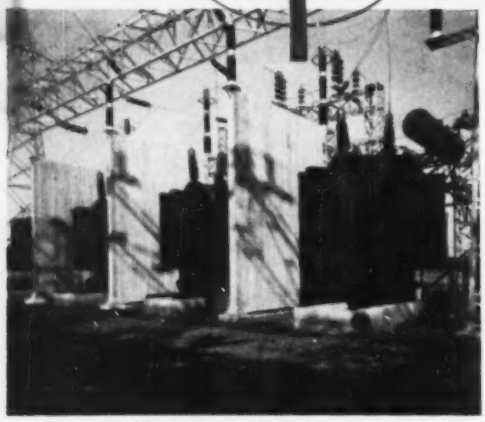
POWER CENTERS

Pennsylvania

an important component of many

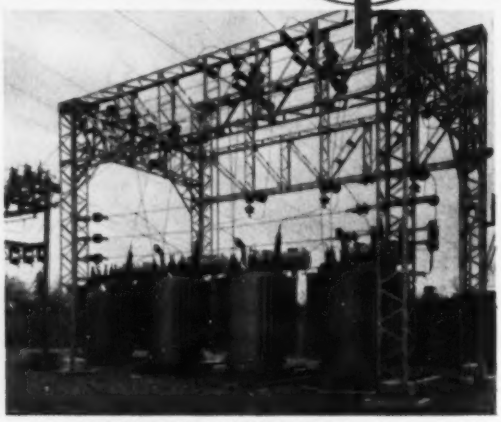
ALTAVISTA SUBSTATION Virginia Electric & Power Company





TRANSFORMER COMPONENT

Four 15,333 Kva Pennsylvania Auto Transformers.
Single Phase, 60 Cycles, 55°C. Rise.
Voltage: 79680-138000Y-69840/69000Y,
13200Δ volts.



TRANSFORMER COMPONENT

Four 2,000 Kva Pennsylvania Transformers.
Single Phase, 60 Cycles, 55°C. Rise.
Voltage: 38100/66000Y-7960/13800Y-
2400/4160Y volts.

TRANSFORMERS . . .
"Selected" Outdoor Substations

There is only one positive way of combining the finest equipment into an outdoor substation, and that is by careful selection of all component parts.

Only by carefully selecting transformers, switchgear, breakers, etc., can the engineers of an Electric Utility be sure that all items of the station will meet the prescribed mechanical and electrical requirements. And *only* by selective ordering can the Utility get what it actually *wants* and *needs*.

Pennsylvania transformers are an important component in many outstanding outdoor substations. The Midway Station of the Cincinnati Gas & Electric Company and the Altavista Transmission Substation of Virginia Electric Light and Power Company are examples of two modern stations in which the component transformers were supplied by Pennsylvania Transformer Company.

•

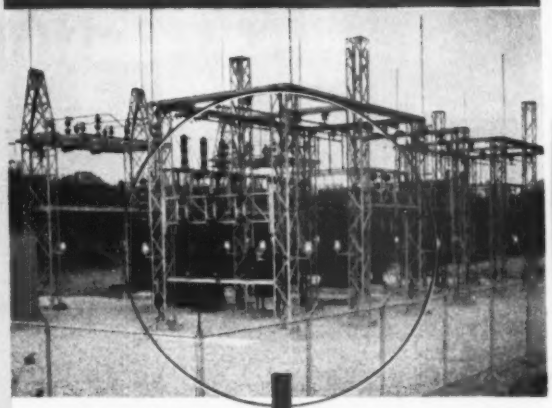
Pennsylvania Power Transformers are available in sizes up to 100,000 Kva, and voltages up to 230 Kv. Transformers with ratings of 60,000, 70,000, and 100,000 Kva are now under construction in the Pennsylvania plant.

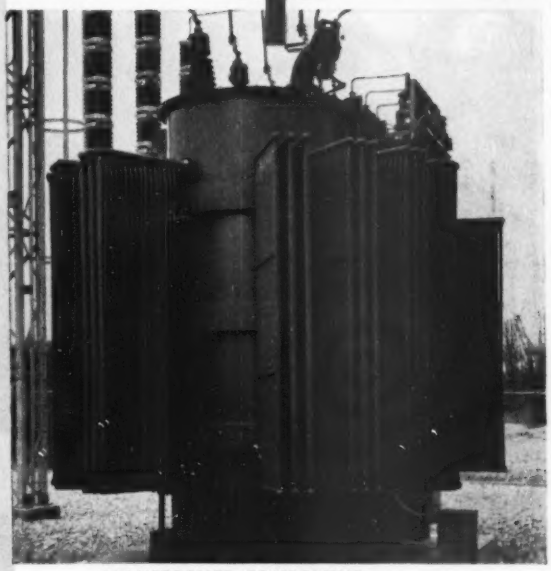
NOTICE TO ELECTRIC UTILITIES

You are invited to inspect the plant and facilities of Pennsylvania Transformer Company. Arrangements can be made through a Pennsylvania sales representative, or by contacting Pennsylvania's Sales Department, 529 Adams Avenue, Canonsburg, Pa.

Pennsylvania TRANSFORMER COMPANY
CANONSBURG, PENNA.
Greater Pittsburgh District

MIDWAY SUBSTATION





TRANSFORMER COMPONENT

Two 20,000 Kva Pennsylvania Transformers.
3 Phase, 60 Cycles, 55°C. Rise.
Voltage: 66000-33,000Y volts.

ACSR and

ALCOA

ALCOA

Alcoa Technical Co-operation

Alcoa pioneered aluminum conductor over 50 years ago . . . has been supplying technical co-operation ever since. That's why Alcoa developed a staff of technicians first in their field.

The six men in the photograph at left have been Alcoa Electrical Conductor Supervisors for an average of seventeen years—a total of over a hundred years of customer service. They represent the quality of the men behind the quality of the product.

For Alcoa delivers only the highest quality wire and cable, aluminum or ACSR, to every job.

Call your nearest Alcoa sales office for Alcoa aluminum wire and cable . . . the best in service.

ALUMINUM COMPANY OF AMERICA

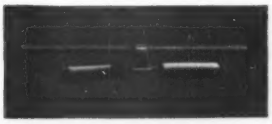
2100-E Gulf Building • Pittsburgh 19, Pennsylvania

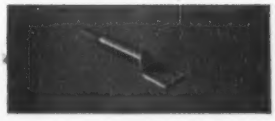
NOW 6:30 P.M. EDST every Sunday—
"SEE IT NOW" with Edward R. Murrow
. . . brings the world to your armchair . . .
CBS Television

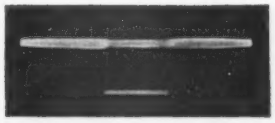
FIRST IN ALUMINUM
FIRST IN A·C·S·R

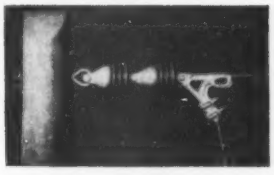
ALCOA ACCESSORIES

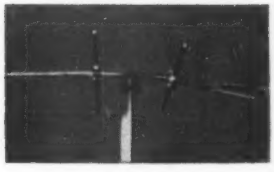
Alcoa has developed a complete line of job-proven accessories for aluminum cable and ACSR.











PENTA preservative performs in "tough spot"

A lot of water has gone over the penta-treated timber in a power company's dam in northern Wisconsin. Yet, in three years of constant service, the 2 x 12 planks in the dam are in sound condition where, previously, it had been necessary to replace them after that length of time. Many *more* years of service are expected from the treated wood. The planks were treated by 24-hour cold soaking with 5% Monsanto Penta preservative in fuel oil.

Monsanto Penta is a stable preservative. As this experience shows, it withstands leaching. It is a uniform chemical that, with correct application, gives dependable results. With proper treatment, penta-preserved wood can be painted or varnished.

For information on the use of Monsanto Penta for wood preservation . . . for names of custom treaters . . . for sources of ready-treated wood . . . contact the nearest Monsanto Sales Office or write MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

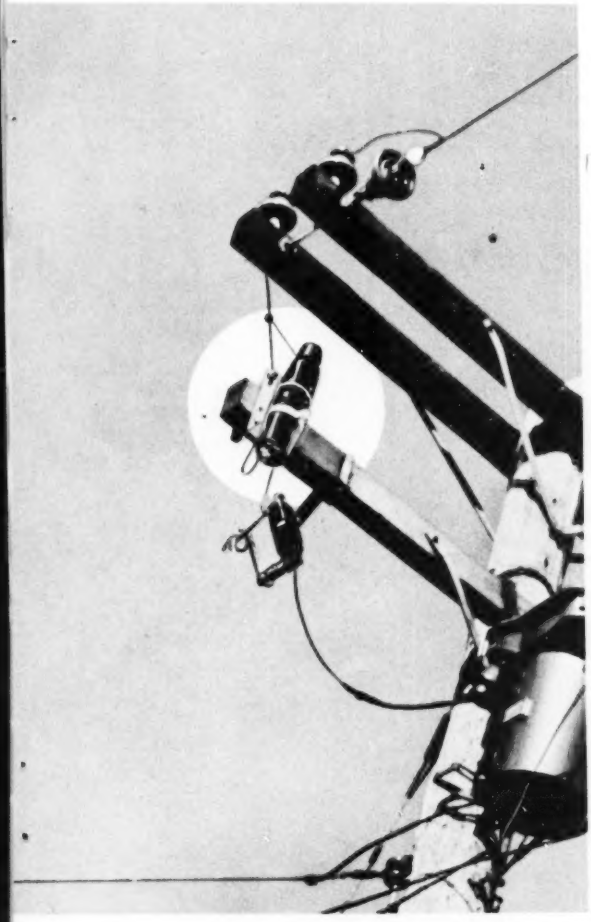
DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto Canada Limited, Montreal.

PENTA

MONSANTO
CHEMICALS – PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

NEW EXPULSION ARRESTER OFFERS HIGHEST SHORT-CIRCUIT CAPACITY



The new Westinghouse LX Arrester is designed to provide the *reserve of protection* needed as a result of increased concentration of power at distribution centers. Combining the expulsion principle with positive current-limiting action, the arrester operates successfully at locations of very high-bolted fault current—20,000 amperes at 3 kv!

Gaps and terminals shielded for safety

The LX Arrester is not only efficient but also completely safe. The series gap and the ground terminal are shielded by porcelain. With the polyethylene terminal cover, protection from exposure to live parts is complete.

Another advantage for the lineman is the easy voltage identification . . . each ring on the main porcelain body indicates a rating of 3 kv.

UNUSUAL DESIGN PROVIDES EXTRA PERFORMANCE BENEFITS

A skillful design involving the use of a spiral grooved filler produces an arc path of considerable length which sparks over at very low value. There is no "IR" drop of the kind encountered in valve-type arresters . . . the arc drop is the only voltage that appears across the arrester during the flow of surge current.

Westinghouse representatives have the full story on the LX Arrester. Ask for complete details or write for Descriptive Bulletin 38-150 to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Penna.

YOU CAN BE SURE... IF IT'S Westinghouse

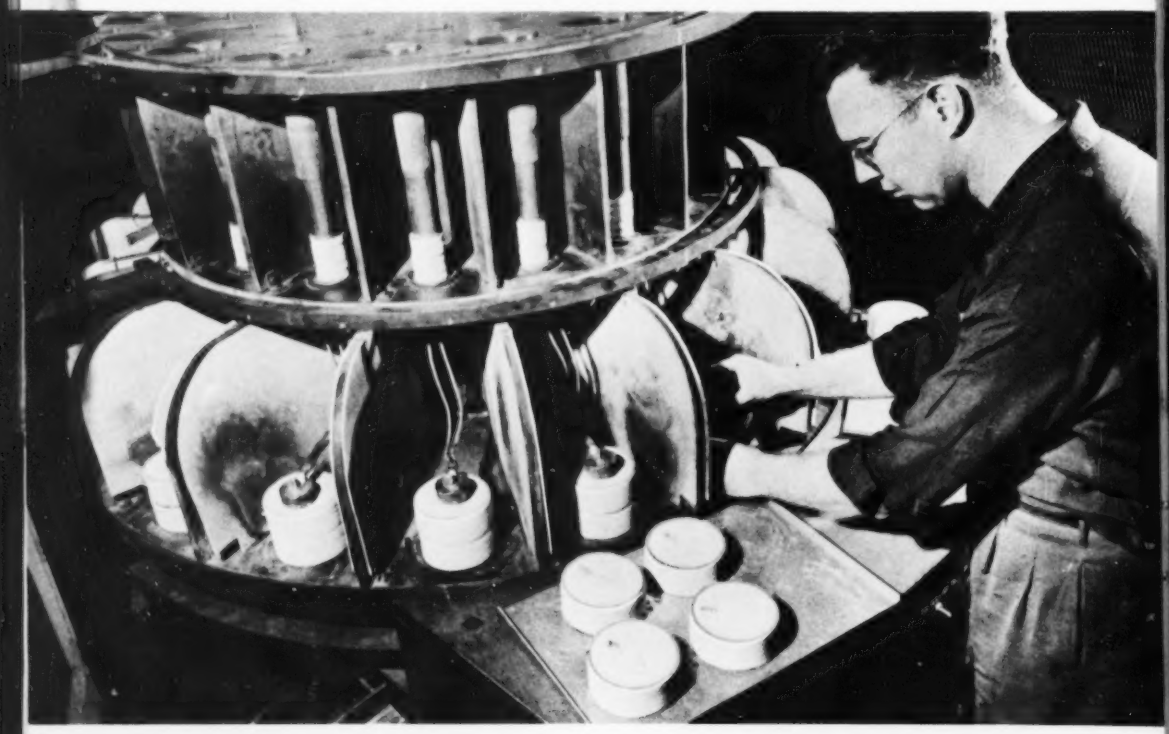
LIGHTNING ARRESTERS

Rigid testing proves quality of Westinghouse high-voltage arresters

Because lightning arresters are a vital part in the protection of costly station equipment, Westinghouse tests every arrester to assure greatest reliability. Extensive production-line tests (shown here) insure the adequate performance of Westinghouse SV & LVS Arresters under the most severe operating conditions.

The heart of the arrester, the Autovalve® block, undergoes four separate tests; durability, hot-lightning, volt-ampere characteristics, and 60-cycle sparkover. They prove the ability of the arrester to divert lightning, arrest power-follow current and protect equipment. Proper assembly is checked by the 60-cycle sparkover test—and finally, the complete arrester is moisture tested.

The excellent on-the-job service records of Westinghouse Arresters attest to this rigid method of quality control. It's another reason why you can be *sure* when you specify Westinghouse Arresters for any high-voltage application.

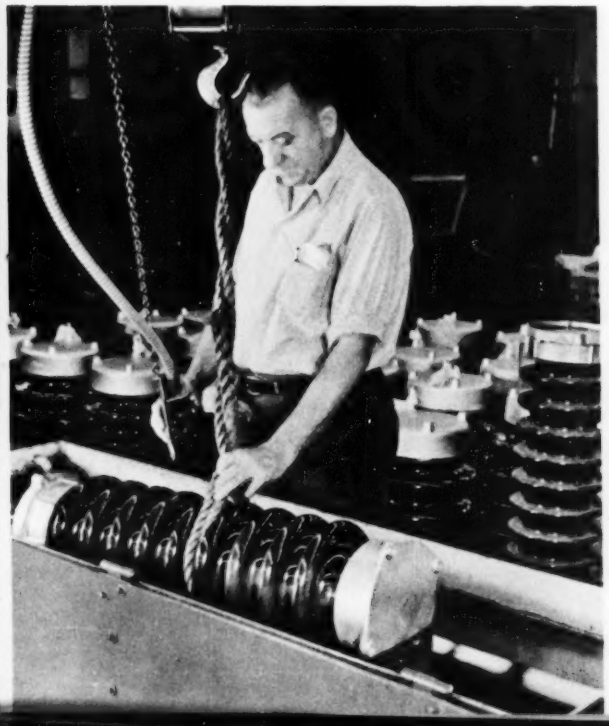


Durability test . . . A five percent sample of each batch of station arrester, Autovalve blocks receives at least fifty, 10,000-ampere long-tail discharges, superimposed on rated 60-cycle voltage, as a minimum quality requirement. If the 5% sample proves satisfactory, each block in the balance of the batch is . . .

Hot-lightning tested with two separate surges, superimposed on rated 60-cycle voltage, on a revolving test table as pictured above. For station-type blocks the current peak is 10,000 amperes. Line and distribution units get peak surge of 5,000 amperes. Series gaps are in the white rings above each cubicle.

Volt-ampere test assures that the "IR" drop of each Autovalve block is within the required limits. A 1500-ampere surge is used for this purpose. During the discharge, volt-ampere characteristics are observed on the screen of the cathode ray oscilloscope.

Sparkover test makes sure the 60-cycle breakdown and the internal assembly of every Westinghouse Autovalve Arrester are correct. It provides conclusive proof that the arrester will withstand its power voltage rating with considerable margin.



Moisture test . . . To assure that the complete arrester is absolutely moistureproof, each one is submerged in water and seal tested for leaks under 30 pounds per square inch of nitrogen gas pressure. Every arrester must pass this test without leakage. Westinghouse has conducted this test for 20 years.

YOU CAN BE SURE...IF IT'S

Westinghouse

LIGHTNING ARRESTERS

NOT ONE CASE OF MOISTURE TROUBLE REPORTED ON WESTINGHOUSE LV ARRESTERS IN 12 YEARS!

The excellent performance record of LV Arresters actually dates back to 1932, when Westinghouse introduced the "spun-on" metal cap. This feature licked the moisture problem permanently! So permanently, in fact, that it has not been necessary to alter this basic design in the past twenty years. The result; not one case of moisture trouble, radio interference or line lockout reported on the LV Arrester in 12 years!

Many other features contribute to the impressive service record of the LV Arrester. Its low, uniform sparkover—a result of pre-ionizing tips; its high surge capacity provided by preformed, pre-tested Autovalve blocks. Its protection against line lockout, assured by the drop-out feature.

Get Complete Information

For complete information on Westinghouse LV Arresters contact your Westinghouse distributor or Westinghouse representative. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-60786

YOU CAN BE SURE... IF IT'S
Westinghouse

LIGHTNING ARRESTERS

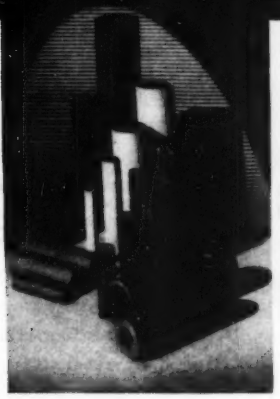
. . . taking a lot for granted . . .

SNAKE JUICE

You take a chance on what's in the bottle on the strength of a label of unknown origin and questionable validity, but — when you don't know what you are getting the chances are you are not getting what you want.

"Every other day
Take a drop in water,
You'll be better soon
Or at least you oughter"

when you need MICA you can't take chances



getting what you ask for

You buy mica because nothing else will do the job as well — so why not go all the way and buy the best mica — it costs little or no more. Get this thought fixed in your mind — *Macallen Mica* — then write it into your specifications.

when you think of MICA . . . think of MACALLEN

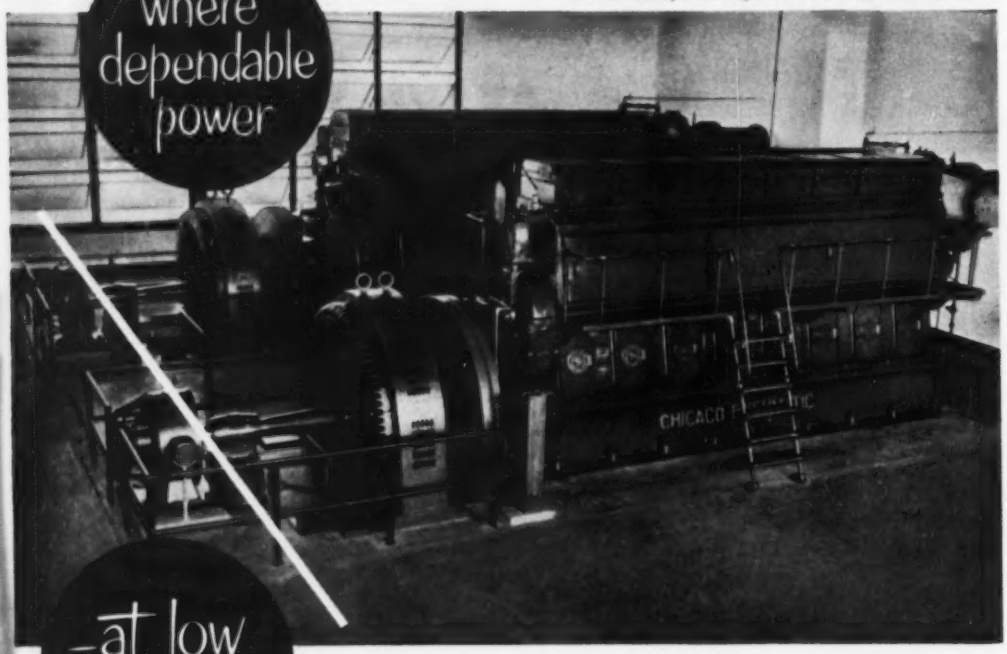
MACALLEN MICA — ALL FORMS, ALL QUANTITIES — ALL DEPENDABLE

THE MACALLEN COMPANY

16 MACALLEN STREET • BOSTON 27, MASS.

CHICAGO: 565 W. WASHINGTON BLVD. • CLEVELAND: 1231 SUPERIOR AVE.

where dependable power



Two CP 1500 hp Diesel Engines in a western public utility station.

-at low cost-

is a "MUST"

CP ENGINES, for straight Diesel, Dual Fuel, or Gas operation, have earned an enviable reputation for providing thoroughly dependable power at low cost. They are widely used in public utility stations, municipal power plants, institutions, petroleum pipeline stations, and in many kinds of industrial plants.

They are particularly suitable for voltage booster stations at the end of long transmission lines; for emergency hook-ups during power line repairs and replacements; for local generating plants in isolated areas; as well as for furnishing power in central stations.

Available in units up to 1750 hp., the CP line includes both normally aspirated engines and supercharged engines incorporating the Elliott Turbocharger.

CP Fiftieth ANNIVERSARY

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

IS NEOPRENE ALL YOU WANT

On all sides buyers ask, "Is [illegible]et of that cord or cable neoprene?" When assured that it is, they seem quite satisfied that they are getting the highest quality product available. That is not necessarily a sound conclusion. Here's why.

Neoprene is only a raw material. To be of use it must be **properly** compounded with antioxidants, carbon black, vulcanizing agents, and other materials. In other words, technical skill in properly compounding neoprene is just as important as using neoprene itself.

TIREX Cords and Cables were the first to be made in this country with a heavy duty jacket. Proof of the fact that compounding skill is important is shown by the fact that in the intervening thirty years TIREX has kept the leadership in the field of portable cords and cables. Simplex skill developed the cords and then kept them leaders against all comers.

The next time you need a portable cord or cable specify and be sure you get Simplex-TIREX Cords and Cables. The name is embossed on the jacket for your protection.

SIMPLEX-TIREX IS A PRODUCT OF SIMPLEX RESEARCH

SIMPLEX TIREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

What are your Truck Problems?

FWD offers 78 combinations of trucks and equipment

to answer a wide range of needs

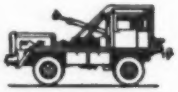
FOR CONSTRUCTION — Consists of earth boring machine with integral derrick, winch and platform body . . . on light-duty, medium-duty or heavy-duty FWDs.

FOR MAINTENANCE— Conventional 3-man cab with line maintenance body, winch, derrick. Combines with light-duty, medium-duty or heavy-duty FWDs.

FOR MAINTENANCE — 2-man cab over engine style with crew compartment in maintenance body. Winch and derrick. Matched with medium-duty FWD chassis.

FOR MAINTENANCE — Conventional 3-man cab with crew compartment in maintenance body. Winch and derrick. For light-duty, medium and heavy-duty FWD's.

GENERAL PURPOSE TRANSPORT — H 6 x 6 with 5th wheel for use with lo-boy, semi-trailer, full 4-wheel or pole trailer. Winch mounts behind 3-man cab. Tool compartment under platform.



FOR CONSTRUCTION (and maintenance of energized lines) — For one-man operation. Patented. Front-mounted earth-boring machine with integral telescopic derrick — rear-mounted engine — winch. For heavy-duty FWD.

ALL-PURPOSE LINE MAINTENANCE AND CONSTRUCTION — 2-man cab-over-engine. Crew compartment in combination platform and line body. Includes earth-boring machine, derrick, winch. For medium-duty FWD.

FOR MAINTENANCE — Heavy-Duty 6 x 6 has 2-man cab over engine. Crew compartment built into maintenance body. Matched combination includes winch and derrick.

FWD is the central source for complete mobile workshops . . . including cabs, winches, derricks, boring machines, platform and line bodies. These components, mounted on famous FWD chasses, give you an unparalleled choice for line maintenance and construction.

Specify FWD to lower your costs and accelerate schedules on both routine and emergency service.

Ask for a copy of the new FWD "Code Book," which makes it easy for you to select the motorized unit best suited to your work. In addition, we will show you a 20-minute movie, demonstrating outstanding FWD performance.

THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis. • Canadian Factory: Kitchener, Ont.

World-Wide Sales and Service

T&B METHOD
Fittings and Tools for ALUMINUM and Copper Conductors

FOR ACSR & ALL-ALUMINUM CABLES

Tension Splicers

Dead Ends

Jumper Splicers

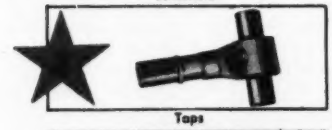
Repair Sleeves

Light Portable Tools (for tower work)

FOR UNDERGROUND & INDOOR INSTALLATION

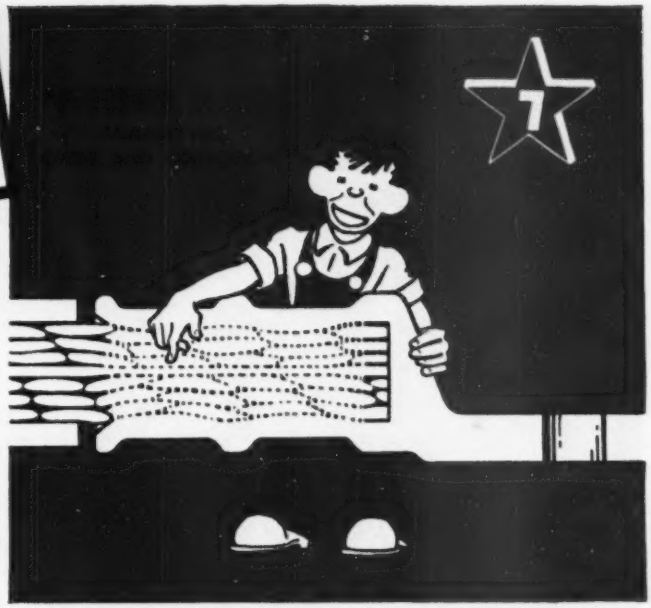
Splicers

Terminals



Taps

Connectors



Tight, sound connections every time with T&B Method Aluminum Terminals for aluminum cable

Serrations inside the terminal barrel scrape the oxide off the aluminum cable. Tremendous pressure exerted by lightweight T & B tools rubs the metal clean—compresses the stranded cable to the equivalent area of solid rod—squeezes the air out of the cable—and permanently seals it against corrosion! L-o-n-g contact of barrel to cable counteracts tendency to cold-flow. *No joint compound needed.*

YOU GET THEM EVERY TIME BECAUSE . . .

The high-conductivity, ductile aluminum barrel flows readily under compression—and the dies exert just the *right* amount of compression. Die code number stamped on every barrel assures use of correct die—and marking shows exactly where to place the die on the barrel. Once the dies have closed, the job is *sure* to be right.

ENGINEERED RIGHT . . . DISTRIBUTED RIGHT

T & B Method fittings and tools, like all T & B quality fittings, are designed for lowest installed costs. They're furnished exclusively through local T & B distributors under the T & B Plan.

FROM CIRCLE TO HEX IN SECONDS

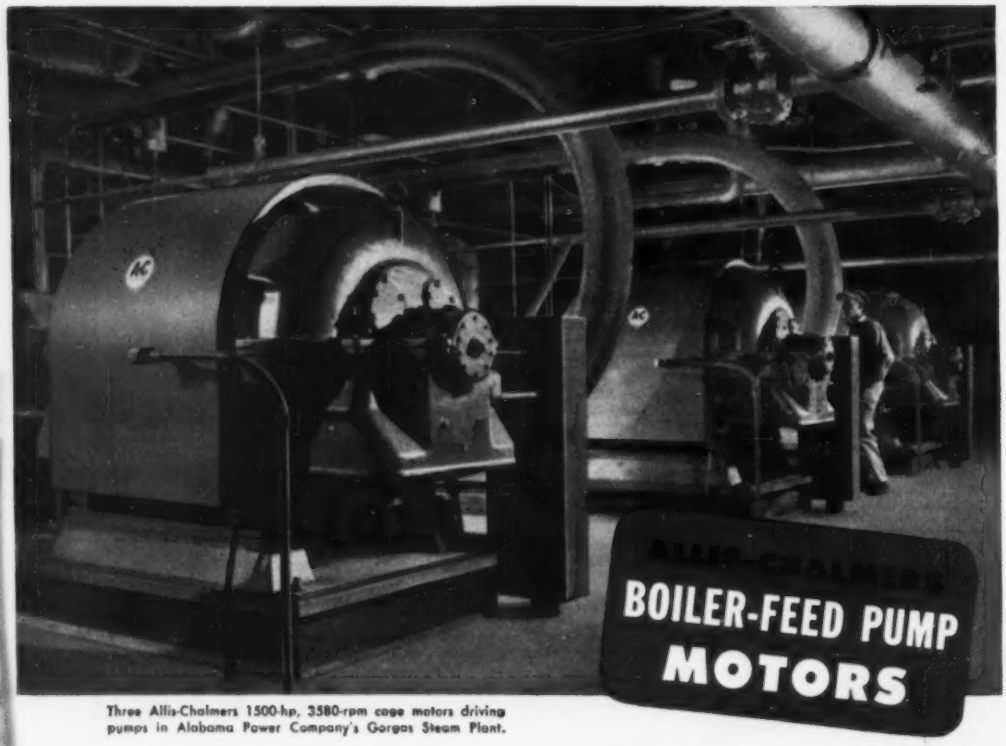
You start with a circular cable (a typical one consists of about 75% metal, 25% air). You compress it, by the T & B Method, to the equivalent area of a solid rod—as the dies force the fitting from circular to the characteristic T & B Method hexagonal shape—all in the space of just a few seconds!

FOR THE FULL STORY ON THE T & B METHOD, WRITE FOR BULLETIN 67

THE THOMAS & BETTS CO.

INCORPORATED

35 Butler Street
Elizabeth 1, New Jersey
Thomas & Betts, Ltd., Montreal, P. Q., Canada



Three Allis-Chalmers 1500-hp, 3580-rpm cage motors driving pumps in Alabama Power Company's Gorgas Steam Plant.

Give Extra Protection TWO WAYS!

BECAUSE LOSS OF FEEDWATER can lead to extensive boiler damage, it is common practice to provide protection by means of a standby boiler-feed pump unit. It is equally good practice to insist on the additional protection of the operation-proved reliability of Allis-Chalmers motors.

YOU GET THESE FEATURES

As the result of a quarter century of development, A-C two-pole cage motors offer you these features:

- Ring-oiling adequate for prolonged emergency operation without forced-feed oiling.
- Equalizing air pressure chambers to positively keep oil out of motor windings.
- Air distribution arrangement that eliminates hot spots in both stator and rotor.
- Forged end rings, drilled for cage bars.
- *Dew-drop* bars that give better performance and stay tight in rotor core.
- Oxygen-free copper or deoxidized copper-base alloy bars and end rings to eliminate embrittlement from silver-brazing.
- Separate steel balancing rings for dynamic balancing without weakening end rings.

BULLETIN TELLS THE INSIDE STORY

For more details about these large two-pole cage motors, ask your nearby A-C representative for Bulletin 05B7550, or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3719

ALLIS-CHALMERS

Minutes pay off for years!

In a few minutes you can see for yourself what International Trucks have that no other trucks can give you.

You need only visit an International Truck Dealer or Branch. There you'll get the facts on the lower operating and maintenance costs, and longer truck life you get from the International Truck engineered for your job.

A few minutes will pay off in years of better truck performance. So stop in soon.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

Check these exclusive advantages of Internationals:

- All-truck engines—exclusively for truck work—built in the world's largest truck engine plant.
- The "roomiest, most comfortable cab on the road"—the Comfo-Vision Cab designed by drivers for drivers.
- Super-steering system—more positive control, easier handling and 37° turning angle.
- Traditional truck toughness that has kept International first in heavy-duty truck sales for 20 straight years.
- 115 basic models . . . everything from ½-ton pickups to 90,000 lb. GVW ratings.
- America's largest exclusive truck service organization.

International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

INTERNATIONAL TRUCKS

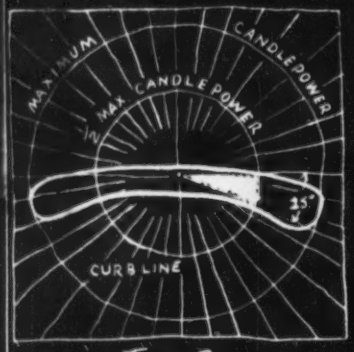
More than One Million Now on the Road

Model L-120, 127 inch wheelbase, special utility body, 5,400 pounds GVW.

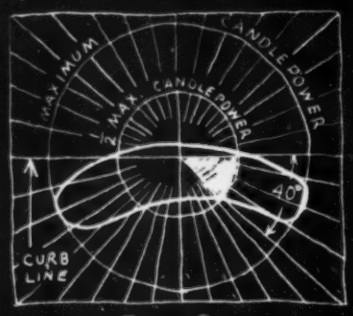
No. 2 in a series

PRACTICAL PROBLEMS TO CONSIDER IN STREET LIGHTING.....

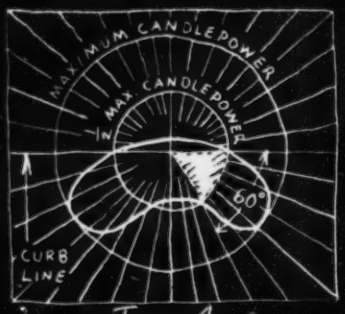
Type 1 Residential streets
Mounting height equal to roadway width



Type 2
Narrow roadways
1.6 X Mounting height



Type 3
Medium roadways
2.7 X Mounting height



Type 4
Wide roadways for Main business streets
3.7 X Mounting height

. . . SELECTING THE RIGHT DISTRIBUTION

Proper distribution of light is essential to effective roadway lighting. Since it is neither practical nor economical to apply one distribution for all roadway widths, industry standards have been established:

Type I is a two-way distribution used on narrow residential streets where economy suggests long spacing between units. For best results, the unit should be mounted over the center line of the street. The principal light is confined to the street surface.

Types II, III and IV may be used on any type of street, depending on its width. The luminaire is usually mounted at or near the curb line, extending 3 or 4 feet out over the street.

Selecting the right distribution, however, is only part of the problem. For practical engineering help in solving all street lighting problems, get the new Westinghouse Street Lighting Engineering Guide, B-5460, Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. . . . or consult with us on any street lighting problem.

Punched reprints of this series of advertisements are also available for filing.

J-04310

Westinghouse AK-10, one of the family of standard, interchangeable units designed to provide all five I.E.S.-A.S.A. distribution patterns.

YOU CAN BE SURE . . . IF IT'S

Westinghouse

LIGHTING DIVISION

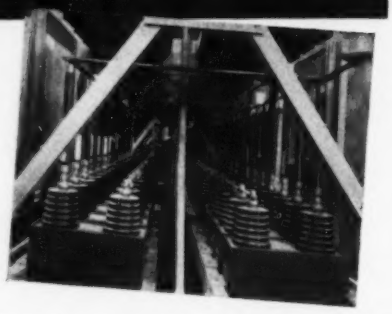
Edgewater Park, Cleveland, Ohio

99.5%

BONNEVILLE reports:

TROUBLE-FREE SERVICE FROM IT'S C-D CAPACITORS

Bonneville Power Administration reports that its C-D capacitors have so far delivered over 1,100,000,000 Kvar hours of 99.5% trouble-free service — an unmatched field performance record!



a typical time-tested C-D installation

C-D 18,790 Kvar sub-station, part of 20,160 Kvar purchased for Longview in 1942.

A C-D engineer will be glad to point out the many dollar saving characteristics of C-D capacitors.

CORNELL DUBILIER ELECTRIC CORP.
DEPARTMENT 052A
SOUTH PLAINFIELD, N. J.

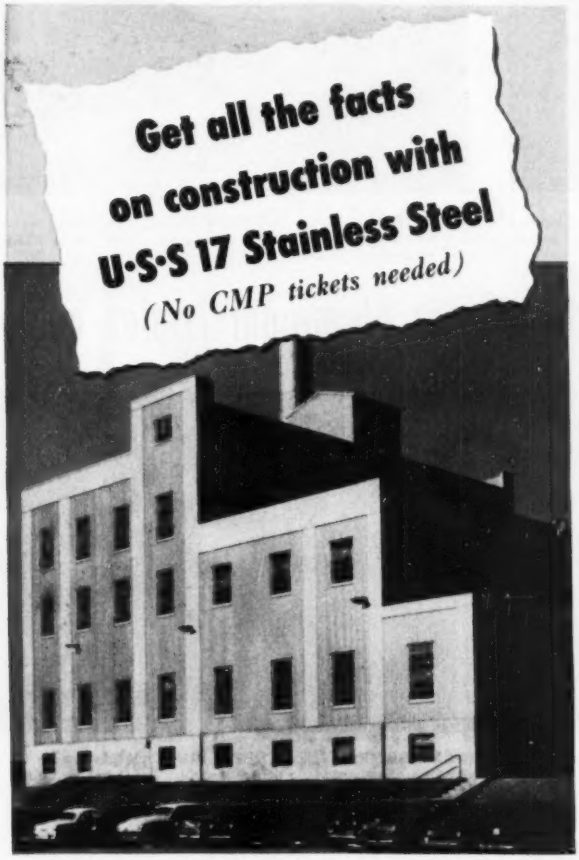
1910
1952

CONSISTENTLY DEPENDABLE

CORNELL-DUBILIER CAPACITORS

PLANTS IN SOUTH PLAINFIELD, N. J.; NEW BEDFORD, WORCESTER, CAMBRIDGE, MASS.; PROVIDENCE, R. I.; INDIANAPOLIS, IND.; FUQUAY SPRINGS, N. C. AND SUBSIDIARY: THE RADIART CORP., CLEVELAND, OHIO

Planning a new building?



THIS POWER STATION makes use of Stainless Steel wall panels. It is owned by Northern States Power Company and is located at Minot, N. D.

WHETHER it's a power plant, an office building or any other type of utility structure, Stainless Steel walls and roofs have *more* to offer you today than other materials for this application.

durable

Stainless Steel's corrosion resistance makes it ideal for buildings that must go up and stay up. In highly corrosive atmospheres where ordinary roofing materials lasted only two years, Straight-Chromium Stainless sheets have been found mechanically sound after 25 years of service.

economical

From the cost standpoint, Stainless Steel is competitive with masonry walls, initially as well as in the long run. And because it requires no maintenance, cost-per-year is much lower than that of masonry or other materials. Stainless Steel's greater strength permits the use of lighter gages and, therefore, lighter supporting members, further reducing the initial cost of the building. Fast, all-weather erection and simplified construction are other practical reasons for choosing this material.

available

Most important of all today, the grade of Stainless Steel suited for this type of application is available now without CMP tickets. It is U·S·S 17 Stainless Steel. Its use is described in detail in our new booklet on this type of construction; use the coupon below to obtain your copy.

AMERICAN STEEL & WIRE . . . . COLUMBIA-GENEVA STEEL . . . . NATIONAL TUBE
TENNESSEE COAL & IRON . . . . UNITED STATES STEEL SUPPLY, WAREHOUSE DISTRIBTUTORS
Divisions of **UNITED STATES STEEL COMPANY, PITTSBURGH**
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S STAINLESS STEEL

USS

2-472

United States Steel Company
Room 2102-E 525 William Penn Place
Pittsburgh 30, Pa.

☐ Please send me your booklet "U·S·S Stainless Steel for Walls and Roofs of Industrial Buildings."

*☐ Please arrange to have your customers send me literature on their particular type of Stainless Steel roof and wall panels.

Name . . . . . Title . . . . .

Address . . . . .

City . . . . . State . . . . .

**United States Steel is the producer of U·S·S Stainless Steel sheet and strip, not a maker of formed roof and wall panels. These are now being manufactured by a number of our customers.*

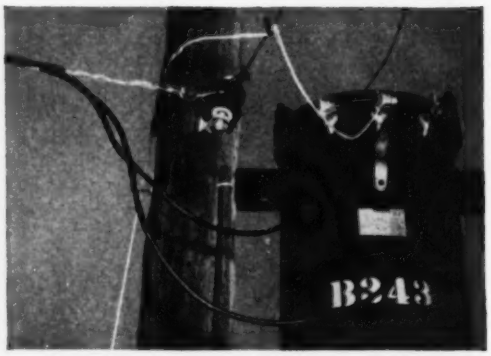
UNITED STATES STEEL

FIGURE THE SAVINGS WITH TRIPLEX CABLE. You save on service drops, secondary lines because initial cost is less than with copper. Average *total* savings over open wire jobs—*from 20 to 30 per cent!*

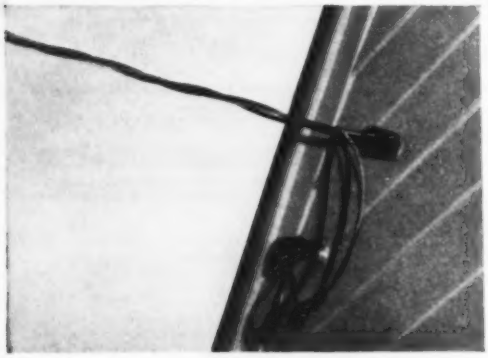
YOU SAVE WITH KAISER ALUMINUM TRIPLEX CABLE because its combination of lightness and strength permits long spans. Wind- and ice-loadings on house and pole are reduced by up to 50%.

Snapshots of savings with Kaiser Aluminum Triplex cable

YOU SAVE WITH KAISER ALUMINUM TRIPLEX CABLE because it's easier, faster to install. A *single* cable instead of three, it gives greatly increased clearances, minimum contact with trees, far less future maintenance.



YOU SAVE WITH KAISER ALUMINUM TRIPLEX CABLE because its coverings of polyethylene or neoprene are light, free-stripping, clean to handle. Highly resistant to moisture, abrasion, fungi. And they will not festoon.



YOU SAVE WITH KAISER ALUMINUM TRIPLEX CABLE because it requires up to ⅔ fewer accessories than conventional open wire construction. Only one house knob needed. Rapidly expanding usage everywhere for service drops.

Act now! Give immediate consideration to the savings and advantages of Kaiser Aluminum Triplex cable on your next job. Send for free booklet giving complete engineering data on new Kaiser Aluminum covered conductor—both weatherproof and self-supporting. Call or write Kaiser Aluminum offices in principal cities, or our distributors: GE Supply Corporation, Westinghouse Electric Supply Company, Line Material Company, Mine Smelter and Supply Company, Tafel Electric and Supply Company. Kaiser Aluminum & Chemical Sales, Inc., Oakland 12, California.

Kaiser Aluminum

Setting the pace—through quality and service

Greater Holding Power

with

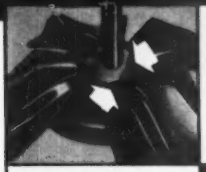
P-L
HEAVY-DUTY ANCHORS

. . . better because

1. **Field tests show greater holding power.**
2. **Heavy duty construction • heavy gauge steel used throughout • deeply embossed and ribbed to withstand heavy loads without buckling.**
3. **Blades are correctly aligned with grain of steel to prevent tearing or breaking • gives a greater factor of safety.**
4. **Easier to install because blades are shaped to glide smoothly into the earth.**

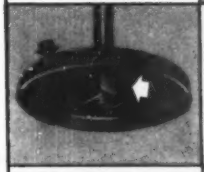
PL-53-6

Also Standard P-L 4-Way and 2-Way Anchors available in 8″ diameter with 100, 115 or 135 sq. inch expanded area. P-L Anchors do an excellent job and can be installed easier in all types of soil . . . outstanding performance where rocks or other obstructions often cause failure of other types of anchors.



Heavy Drive-Plate takes driving force of spreading tool. Blades are extra wide at center of anchor to prevent breaking or buckling.

Blades are deeply ribbed and flanged for extra strength and rigidity. Sharp edged blades are properly curved to glide smoothly and easily into solid, undisturbed earth.



Base plate stamped from extra heavy boiler plate with sharp radius flange and embossed center hole for extra strength. Nut retainer acts as washer giving double thickness under nut. Will take 1″ rod.

10″ diameter, 200 sq. in. expanded area. Compact and easy to install. Shipped completely assembled in one piece. No loose parts to fall off.

PIEPER-LILLARD, INCORPORATED

122 NORTH KIRKWOOD RD. ST. LOUIS 22, MISSOURI

TELEPHONE TERRYHILL 3-2525

Available Now

FRACTIONAL PERCENTAGE OF DBPC MAKES NEW OIL LAST 14 TIMES AS LONG!

DBPC % by Wt.	Accelerated Test Life in Days	% Increase in Oil Life	Total Cost of Oil Per Gal.*	Cost Per Gal. Per Day of Oil Under Test
None	5	—	21¢	4.2¢
0.1	23	360	21¼¢	0.94¢
0.3	70	1,300	23¼¢	0.33¢

*Assuming new conventional oil at 21¢ per gallon. At higher base oil prices, greater savings are realized.

KOPPERS COMPANY, INC.

Chemical Division • Pittsburgh 19, Pa.

to increase the life of your transformer oil

KOPPERS DBPC

● Di-tert-butyl-para-cresol greatly increases the resistance of transformer lubricating oil to oxidation. It assures longer oil life and more efficient transformer performance.

In fact, accelerated oxidation tests prove that new transformer oil treated with only 0.3% of DBPC will last 14 *times longer* than untreated oil!

And DBPC makes reclaimed oil last longer, too. Even when loaded with sludge and badly deteriorated, used oil can be restored by treatment with fullers earth and DBPC. This "rejuvenated" oil *can actually outlast brand-new oil* that isn't inhibited! The cost of inhibiting with DBPC is but a fraction of the cost of new oil. So you see, oil reclamation with DBPC can effect important savings.

Many manufacturers of transformers recommend the use of DBPC, and most major suppliers of transformer oil will, on request, furnish you with new oil that has already been inhibited.

Be sure that your new or make-up transformer oil is inhibited. And use DBPC to increase the life of your reclaimed oil. The savings you'll get will make it worth your while.

DBPC is also available in an oil solution known as "IMPRUVOL 20"

DBPC is a white to yellow crystal that is readily soluble in oil. It is supplied in 100 pound fibre drums. Many users, however, prefer to order it in an oil solution called IMPRUVOL 20. This solution can be applied as easily as the insulating oil itself.

Order either . . . KOPPERS DBPC or IMPRUVOL 20.

See your transformer manufacturer or your oil supplier. Or order your full requirements direct from us.

KOPPERS DBPC...

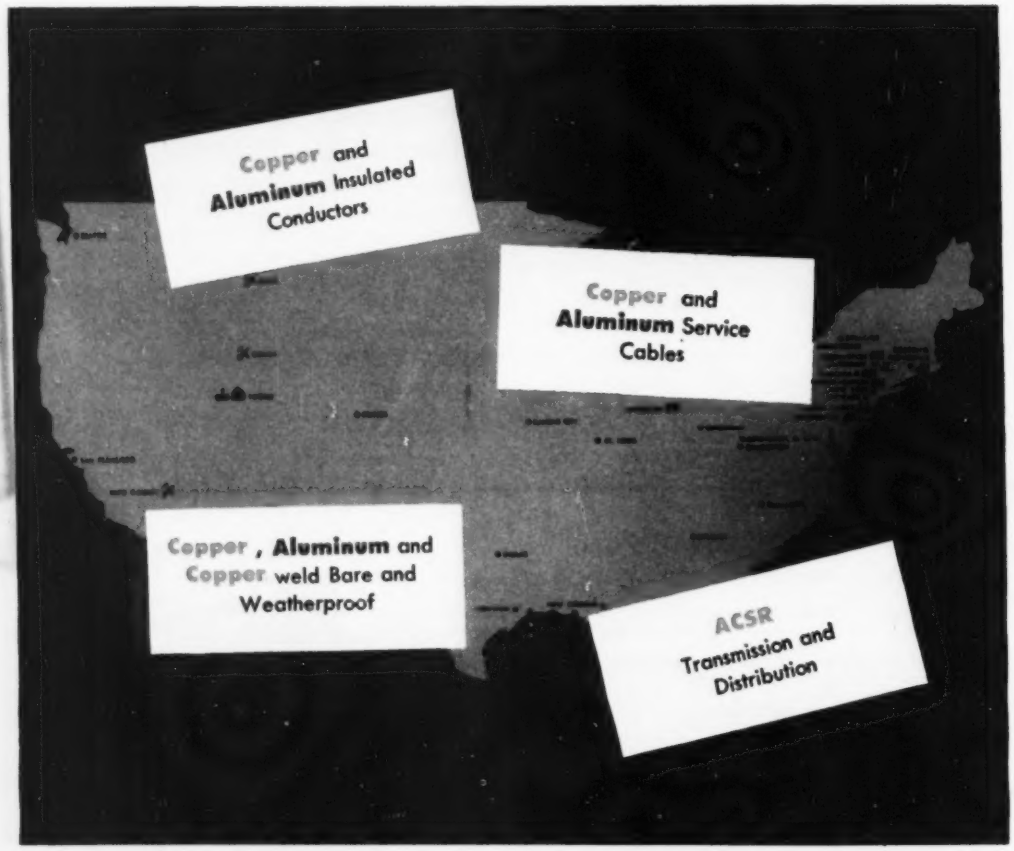
- **REDUCES OIL COST**—Oil treated with DBPC lasts much longer and costs less in the long run.
- **PROTECTS TRANSFORMERS**—By adding DBPC, peroxide formation is held at a minimum. There is less disintegration of insulating paper and fabrics.
- **PROVIDES MORE EFFICIENT OPERATION**—High-load transformers require a sludge-free insulating oil. DBPC keeps sludge formation to a minimum.
- **REDUCES MAINTENANCE COST**—DBPC treated oil requires fewer changes, reduces work and down-time.

SEND FOR THIS FREE FOLDER
Tells how you can save money by inhibiting oil with DBPC.

KOPPERS

first in electrical conductors

Anaconda experience in designing, manufacturing and engineering electrical conductors for every type of power distribution system is nearly as old as the power industry itself—well over half a century.


Copper and Aluminum Insulated Conductors
Copper and Aluminum Service Cables
Copper, Aluminum and Copper weld Bare and Weatherproof
ACSR Transmission and Distribution

ANACONDA® wire and cable company, 25 BROADWAY, NEW YORK 4, NEW YORK

There's a Westinghouse meter for every application!

Forecasts of unprecedented load growth in the coming years suggest many changes in metering practices. That's why a *complete* line of metering equipment holds an advantage for you. Specifically . . .

It's assurance that your future as well as your present needs can be readily fulfilled.

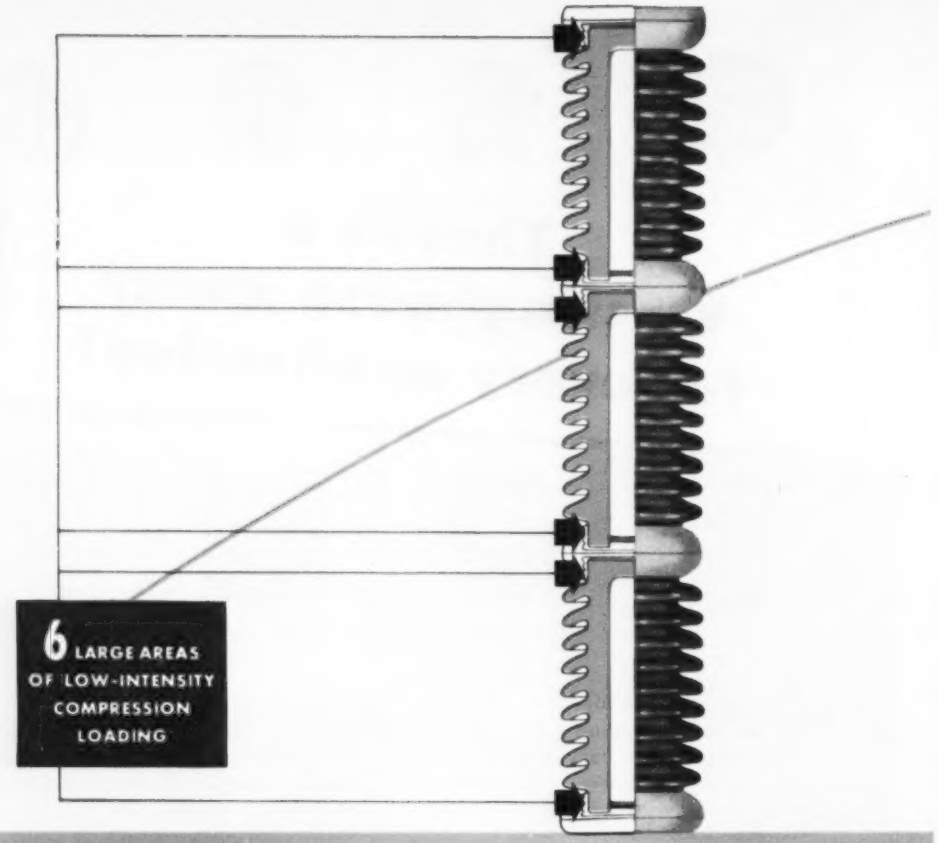
The meters illustrated here are just a few of the broad line of Westinghouse Meters offered to you. These and many more types are available to give you low-cost metering for every circuit application . . . three wire, four wire, wye or delta, or totalizing.

To meet your expanding needs, Westinghouse has continually pioneered new devices to make the desirable changes in metering methods a practical reality. And you have assurance of dependability because every Westinghouse Meter contains the quality and refinements that result from the engineering of a complete line. So whether your needs involve metering large loads or small, single or polyphase circuits, kw or kva, Westinghouse can meet your requirements.

For more information write for Booklet B-4665. Call your Westinghouse Office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-40412-A

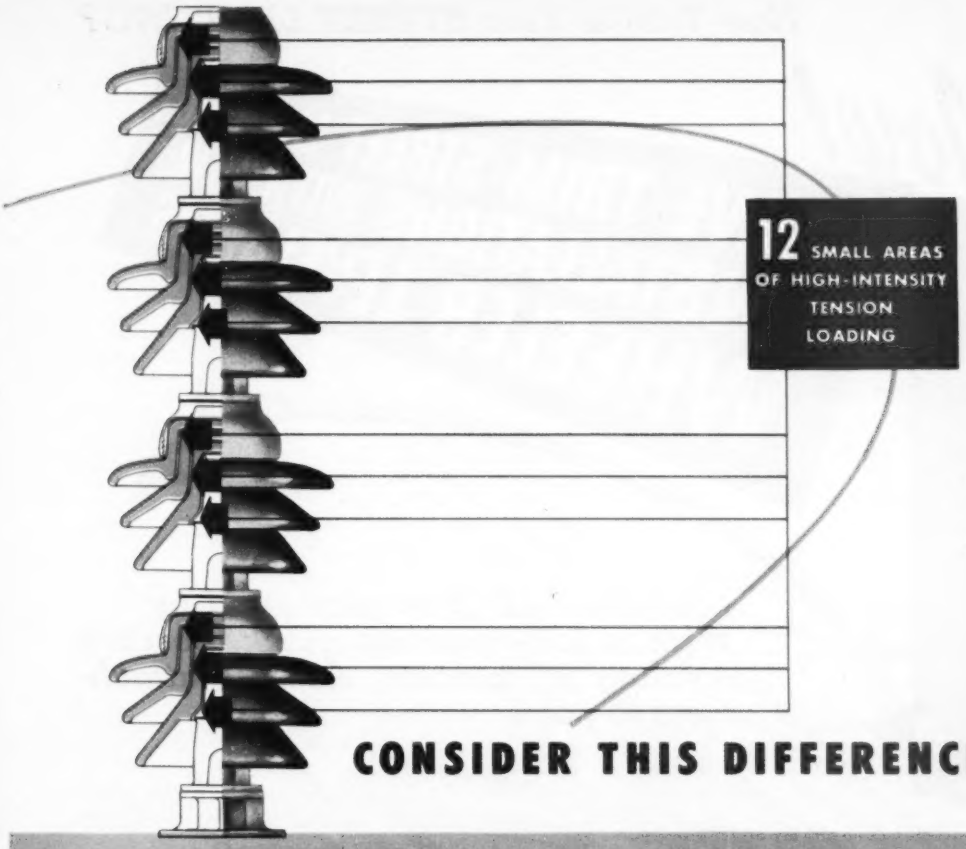
YOU CAN BE SURE... IF IT'S Westinghouse

METERS



Lapp

LAPP INSULATOR COMPANY, INC., LE ROY, NEW YORK



CONSIDER THIS DIFFERENCE...

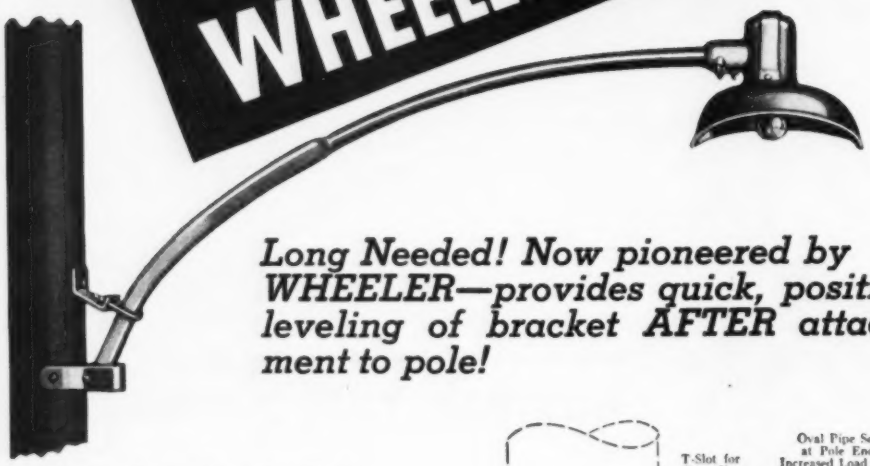
. . . BEFORE YOU ACCEPT ANY SPECIFICATION FOR ANY SWITCH OR BUS SUPPORT INSULATOR

There are important differences between the Lapp Station Post and a conventional multi-part pin-and-cap station insulator—a difference in appearance—a bigger difference in how they work. For switch and bus support, mechanical security is fully as important as electrical characteristics. Rigidity and permanence under stresses from thermal change, tension, cantilever and impact, depend on security of mechanical loading within the insulator. In the Station Post design, Lapp recognizes that porcelain is approximately 10 times as strong in compression as in tension. This advantage is utilized in building the Station Post with hardware externally attached. In the corresponding units sketched above—a Lapp Station Post and a NEMA Standard pin-cap assembly—for duty at 138-161 kv, *compare* the *six* cemented joints of the Lapp Station Post, which can load porcelain only in compression, with the *twelve* nested shells of the pin-cap unit, each an area of loading which depends on tension strength of the porcelain. Isn't the Station Post superiority evident as a simple engineering conception? It's just as evident in operating security . . . in length of life . . . in elimination of outages . . . in cost of maintenance.

How Trim is Your STREET LIGHTING?

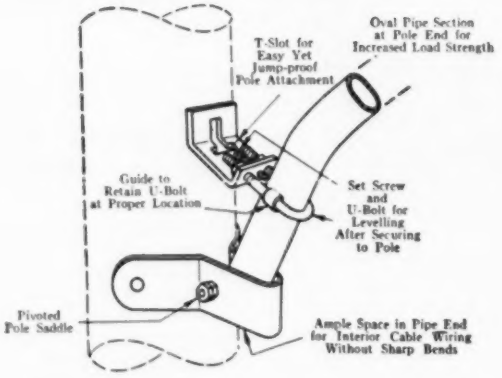
Now!

HAVE TRIM STREET LIGHTING INSTALLATIONS WITH NEW WHEELER LEVELARMS



Long Needed! Now pioneered by WHEELER—provides quick, positive leveling of bracket AFTER attachment to pole!

- ★ **Now, brackets can be quickly and positively levelled, not only at the time of attachment, but at any subsequent time, without removal.**
- ★ **Costly leveling makeshifts no longer required — Heads and brackets always in line.**
- ★ **No brace required on 8 foot lengths. Mechanical strength superior to that of shorter conventional unbraced arms because of oval pipe section.**
- ★ **Durable — hot dipped galvanized steel construction throughout, with rugged hardware assures long life.**
- ★ **Wheeler Upsweep Levelarms represent an important step in the science of street lighting.**
- ★ **For further information, write Wheeler Reflector Company, 275 Congress Street, Boston 10, Mass.**


Oval Pipe Section at Pole End for Increased Load Strength
T-Slot for Easy Yet Jump-proof Pole Attachment
Guide to Retain U-Bolt at Proper Location
Set Screw and U-Bolt for Levelling After Securing to Pole
Pivoted Pole Saddle
Ample Space in Pipe End for Interior Cable Wiring Without Sharp Bends

Meet us at the Cleveland Lighting Exposition May 6 thru May 9, Booths 209-210

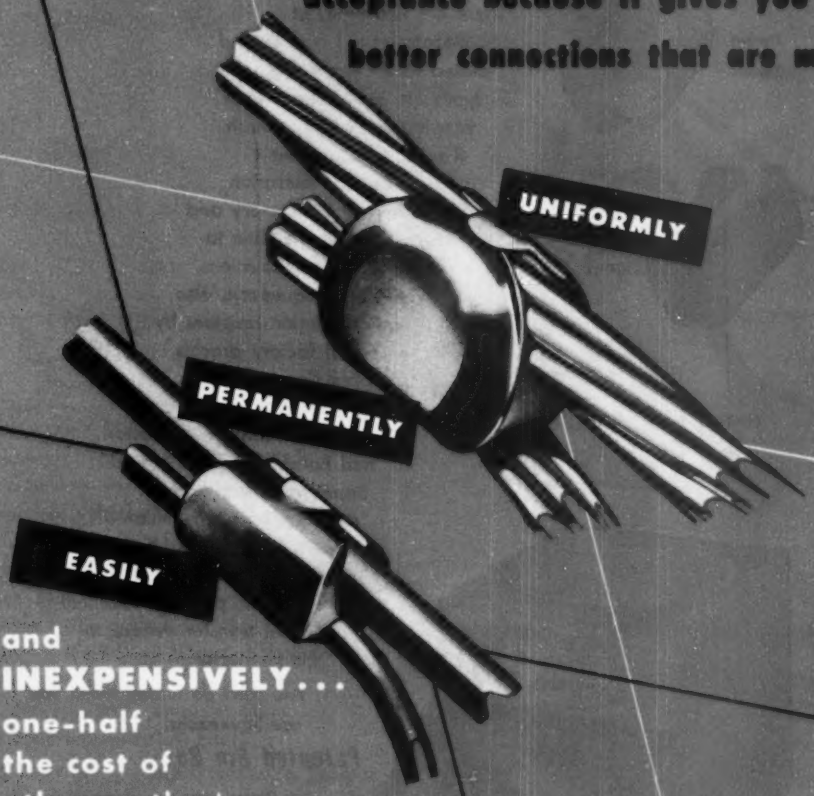
STREET *Wheeler* **LIGHTING**

SPECIALISTS IN SKILLED LIGHTING EQUIPMENT SINCE 1881

THE NEW KEARNEY SQUEEZON

(cold welder connector)

has received enthusiastic industry-wide acceptance because it gives you better connections that are made



and
INEXPENSIVELY...
one-half
the cost of
other methods

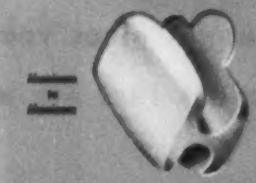
JAMES R. KEARNEY CORPORATION
ST. LOUIS, MO.

See following pages for more detailed information

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue, St. Louis 10, Missouri
Canadian Plant: Guelph, Ontario

SQUEEZONS

give you a perfect electrical bond



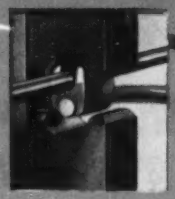
There are two types of Squeezons—solid copper and plated solid copper. Both types are available in sizes ranging from 4/0 through 8 solid. Solid copper Squeezons are corrosion inhibited at the factory and handle all copper line to copper tap combinations. The plated Squeezon, also made oxidation resistant by a special factory process, will handle all combinations of copper, Copperweld, aluminum, ACSR, Amerductor and Ruralductor. The plated Squeezon prevents the combination of dissimilar metals from giving rise to galvanic action, and at the same time, provides excellent current transfer surface in the connector.

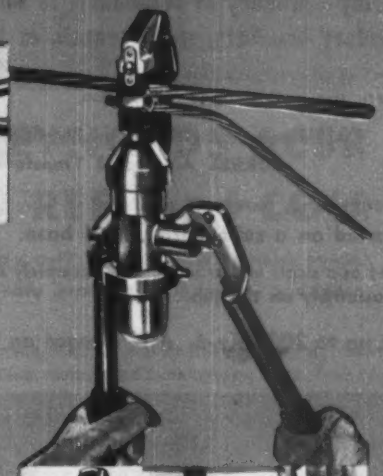
You can't go wrong when you use Squeezons.

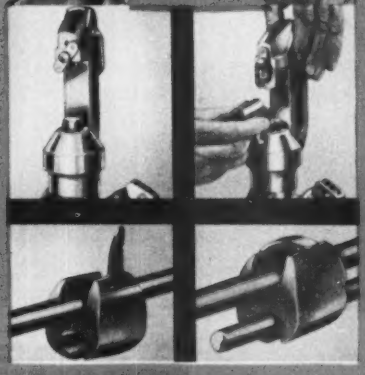
Patented Bin Box

Squeezons are shipped in the patented bin box for easy storing and more efficient handling on the truck.

for connections of every conductor combination







LINE CREWS APPRECIATE THIS SIMPLE EASY METHOD OF MAKING LINE CONNECTIONS

A Click and it's Done!

The KEARNEY SQUEEZON is a pure copper compression-type connector forged in a shape having an "H" cross-section. The connection is made by placing one conductor in the top half of the "H" and the other in the bottom. The sides are then coined over under tremendous hydraulic pressure—applied by pumping one handle of the SQUEEZON Tool. When the second distinct click is heard the connection is then complete, permanent and a perfect electrical bond.

WRITE TODAY for big, 8-page bulletin on the Squeezon.

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue, St. Louis 10, Missouri
Canadian Plant: Guelph, Ontario

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO

JRK-191

KEARNEY *Gives a Little More for a Little Less through Engineering*

SORGEL AIR-COOLED DRY-TYPE TRANSFORMERS

Sub-Stations and Power Centers

for indoor installations

Engineered to meet your exact requirements

Not necessary to design or change your installation to fit a "standard"

Any type of primary switch gear.
Metering—primary or secondary, to suit.
Secondary breakers, main, branch, or tie.

Interlocked or automatic throw-over. Draw-out or stationary types. Magnetic trip, or thermal, or combination.

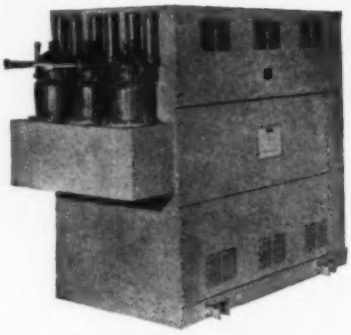
All incorporated with high quality, liberally designed
SORGEL Air-Cooled Transformers

All factory wired, tested and assembled.

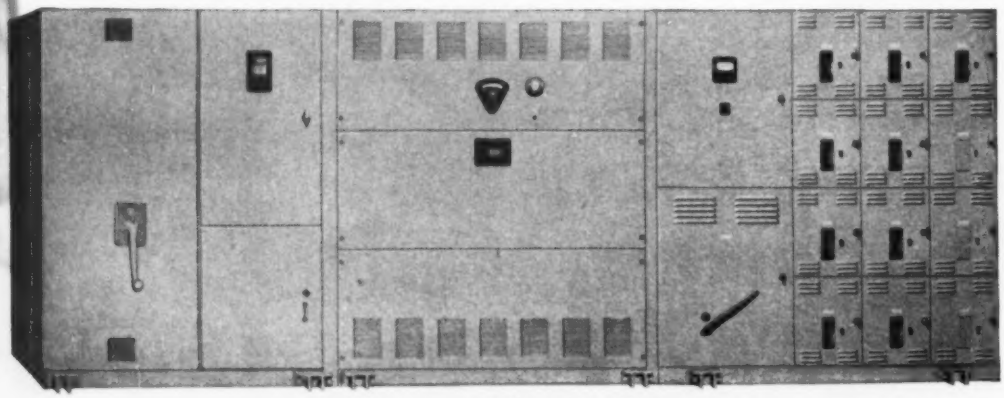
Mounted on a substantial steel base.

Shipped as a single unit or in sections, accurately co-ordinated for easy assembly on the job.

Sizes up to 2000 Kv-a. All voltages up to 15 KV.



500 Kv-a., 3-phase, 4160 volt Transformer, equipped with primary oil fuse cutouts



2000 Kv-a., 3-phase, 13,200 volt unit Sub-Station
With forced draft fans, automatically controlled by temperature indicator to increase transformer capacity 25%; primary fused load break switch and kilowatt-hour meter, secondary voltmeter and drawout circuit breakers.

Also a Complete Line of Conventional Air-Cooled Dry-Type Transformers

¼ to 2000 Kv-a. Single phase and poly-phase. 120—240—480—600 volts.

Sales Engineers in Principal Cities

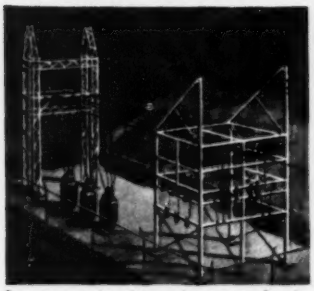
SORGEL ELECTRIC CO., 834 West National Ave., Milwaukee 4, Wis.

Pioneers in the development and manufacturing of Air-Cooled transformers

(Advertisement)

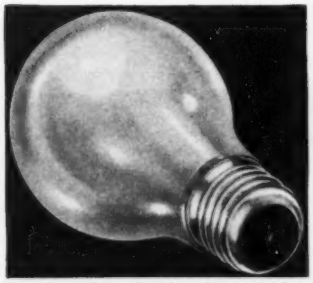
Electrical Applications of Aluminum

Savings in Substations



Important savings in erection costs and maintenance are prime reasons for the growing popularity of aluminum substations with utility companies, co-ops and large industrial users. The light weight and easy fabrication of aluminum permits faster, simpler erection. More shop assembled aluminum components mean less assembly at the job site—less skill is needed in assembly and anywhere from 3 to 7 days can be cut in erecting an average substation. No massive foundations are needed, grounding requirements are much simpler and field drilling is easier—more savings thanks to aluminum. Substation maintenance costs are kept to a minimum because aluminum requires no painting—no costly shut-downs.

Lower Cost Light Bulb Bases



From heavy duty substations down to featherweight light bulb bases, is quite a drop but it's interesting proof that rarely there's a job too large or too small for aluminum. Small jobs can pose tough problems, too. For example, in engineering light bulb bases, it was necessary to develop sufficient rim strength with aluminum of a temper suitable for drawing and working. The method of introducing molten glass to the aluminum base had to be revised. A means of soldering conduction wires to aluminum had to be determined. All the above problems *were solved*—and *at a lower cost* than ever before. True, the savings per unit were small, but on a volume basis they added up to an important figure. Consult Reynolds Aluminum Specialists for assistance on your electrical design problems.

WITH REYNOLDS ACSR MASTER REEL and COIL

Want cost reduction proof? Then see how Reynolds Master Reel and Cable save important time, money and labor.

Reynolds all metal Master Reels sharply decrease handling, storage and bookkeeping costs. *Four Master Reels actually take the place of one hundred wooden reels!* They're easily taken apart and re-assembled around the Master Coil by linemen in the field. They're far stronger than wooden reels and can be used over and over again.

Reynolds Master Coils hold the same amount of conductor as conventional wooden reels. They are carefully waterproofed, lagged and banded for complete protection in transit and on the job.

Plan today to convert to the money-saving Reynolds Master Reel and Coil method. Sooner or later you'll use aluminum—why not now? *Reynolds Metals Company, 2584 South Third Street, Louisville 1, Ky.*

FREE...ACSR MANUAL FOR ENGINEERS CONTAINS COMPLETE INFORMATION, CHARTS AND TABLES. Please request this booklet on your business letterhead.

For Complete Information

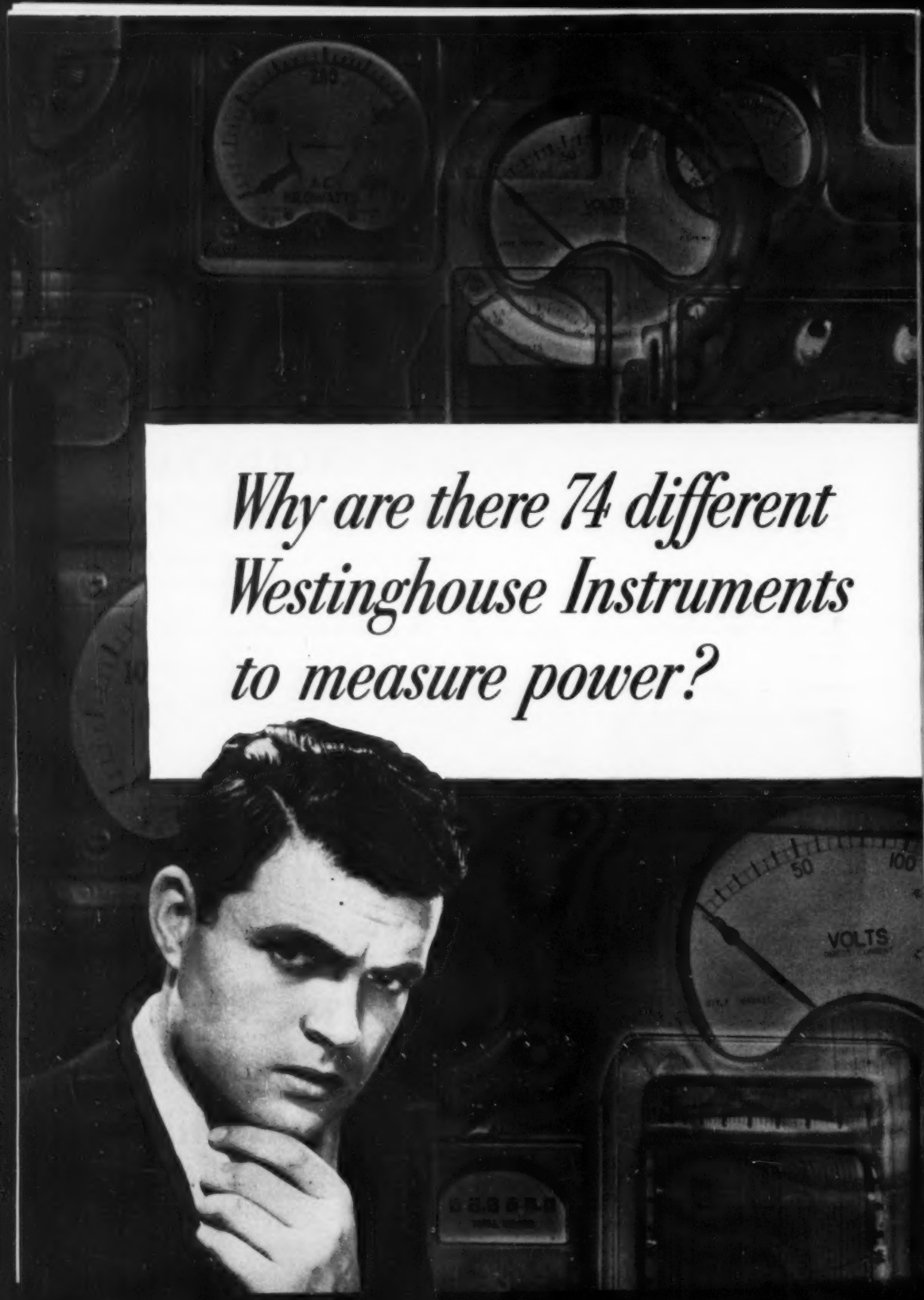
see your Reynolds distributors listed below or write direct to

Reynolds Metals Company, 2584 South Third Street, Louisville 1, Kentucky.

Westinghouse Electric Supply Co., New York, N. Y. (And branches) • North Coast Electric Co., Seattle, Wash. Griffin Manufacturing Co., Dallas, Texas • Southern Electric Supply Co., Houston, Texas • Williamson Sales Co., Shreveport, Louisiana (And branches) • California Electric Supply Corp., San Francisco, California

REYNOLDS METALS

REYNOLDS ALUMINUM



Why are there 74 different Westinghouse Instruments to measure power?

If you produce a product

The wider choice you get in Westinghouse Instruments offers you new opportunities to improve your product's performance, appearance, salability. Whether you want to measure amperes, volts, watts, vars, power factor, frequency or synchronism, there's a Westinghouse Instrument to meet the precise requirements of your customers. And the performance of *all* Westinghouse Instruments meet ASA Standards.

pilot a plant

If your job is supervision of production or plant operation, getting just the *right* instrument can help you gain closer control of a process or more efficient operation of plant facilities. Moreover, Westinghouse offers you competent application assistance to help you employ instruments most effectively.

or probe the unknown

If your job is research, this complete line of instruments serves all your needs for the measurement of electrical values. The diversity of types, for any given measurement, includes many variations in size, types or mounting, types of scale, range, accuracy and styling, as well as instruments to measure position, time, temperature and speed.

you gain benefits like this:

Take the case of a leading electronic equipment manufacturer. They needed to equip tube test stations with a variety of instruments having co-ordinated styling for best appearance; small enough to permit close grouping and accurate enough to serve as "standards". Standard Westinghouse Instruments answered every requirement! Next time *you* need instruments to improve a product, perfect a process or probe a problem . . . specify Westinghouse!

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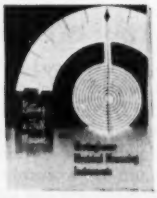

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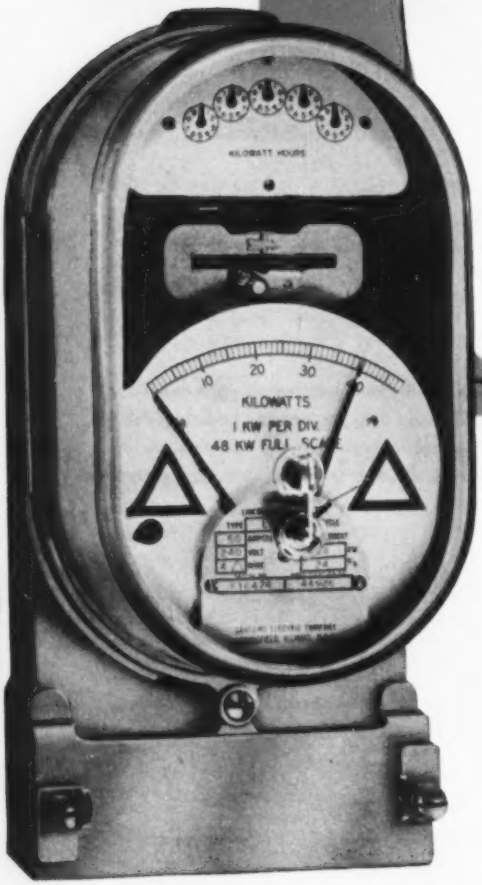
INSTRUMENTS

NEW...

SANGAMO Polyphase Combination Watthour and Demand Meters



TYPE LWP

...for convenient, dependable demand measurement on all polyphase circuits!

The Type LW line of combination watthour thermal demand meters combines a completely standard Sangamo Type LC polyphase watthour meter with a fully shielded Lincoln Type WD watt demand meter of the latest design, having excellent inherent characteristics under widely varying ambient temperature conditions. As in other Lincoln combinations, *no sacrifice* has been made of the established characteristics of either the watthour meter or of the demand meter, since they operate entirely independently of one another.

Types LWP and LWS

Both the Types LWP and LWS meters are supplied in 2-element form for 3-phase, 3-wire; 3-phase, 4-wire Delta; and 3-phase, 4-wire Y. The bottom-connected Type LW is supplied with the conventional polyphase terminal block providing for a maximum of 8 current and 7 potential terminals. The socket Type LW can be furnished either with a 5 terminal base for *network* 3-wire metering, or with as many as 10 terminals for regular polyphase connection.

SM52-6

TYPE LWS

The efficient Lincoln thermal actuating element functions entirely independently of the watthour meter. Lincoln demand meters contain only one element that moves, and that moves very slowly. It consists of a center shaft on which are mounted the indicating pointer and two equal and opposing coiled bimetal strips. These bimetal coils are thoroughly aged under conditions much more severe than full scale operation and are also very accurately paired for balance under wide temperature variations.

Only Measured Facts are Known Facts

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

Some Things Are WORSE THAN STRIKES

This editorial which appears in McGraw-Hill publications was written just prior to the resignation of Charles E. Wilson as Director of Mobilization. The principle it discusses is of basic and continuing importance in our struggle to maintain economic and personal freedom in America.

It is to be hoped that the managements of the steel industry will resolutely resist the efforts of the national Wage Stabilization Board to force them to establish the union shop in their plants. In essence, the union shop means compulsory union membership.

They should resist not because of any financial advantage to the owners of the industry. There would be none. They should resist out of a decent regard for those ideals of our country which we are now fighting in Korea to protect. Moreover, their resistance would, as a matter of fact, benefit the leaders of the organized steel workers by protecting them from the certain and bitter fruits of their "victory" in getting the government to impose the union shop on the steel industry. Their successful resistance would also prevent Premier Stalin and his co-workers from enjoying a hearty laugh at our expense.

Fun for the Russians

This is why the Politburo would find the establishment of the union shop in the steel industry, at the behest of the Wage Stabilization Board, so profoundly amusing. We are fighting in Korea because we believe that armed aggression, promoted by Russia, menaces our freedom. And we are spending hundreds of billions of dollars here at home for armament to protect our freedom at other danger points. When this rearmament program is threatened by a crippling strike, the federal government through its Wage Stabilization Board proposes to buy off the threat by plowing under a vital element of that freedom which we are trying so desperately to preserve.

When the union shop is adopted through voluntary agreement, as it has been in cases covering millions of workers, it deeply undercuts the freedom of the individual. To hold his job he is required to join the union and support it financially whether he wants to or not. In the case of such voluntary agreement, however, the government takes no direct part in thus destroying the freedom of its citizens. It is essentially a private transaction.

Tyranny is the Word

But in the steel case the federal government becomes a party to a direct attempt to impose the union shop. Instead of protecting its citizens in their right to earn a livelihood, the government forces certain of them to join and support a private organization which they have clearly indicated they do not want to join. This they must do to hold their jobs. Tyranny is the accepted designation of government coercion of this kind.

It may be objected that the Wage Stabilization Board merely recommends the union shop, does not order it. This was also true of the action recently taken by a President's Emergency Board, which also "recommended" that working agreements between the

railroads and about a million non-operating railroad employees include a provision for the union shop. A government recommendation, however, can easily be given much of the force of an order, particularly by the calling of a strike to "uphold the hand of the government."

It seems entirely clear that in trying to impose the union shop on the steel industry the Wage Stabilization Board has completely lost its bearings. It was set up to handle labor problems to tide over an emergency. Now it comes up with a revolutionary modification of labor relations in the steel industry which, if adopted, would become a permanent part of the institutional machinery of the industry.

"Too Much Like Hitler"

Early in World War II an effort was made to have the federal government order the union shop for a group of organized coal miners. President Franklin D. Roosevelt, who will go down in history as one of organized labor's greatest champions, blocked it. "That," he said, "would be too much like the Hitler methods toward labor." But now, with supreme irony, the federal government fosters this Hitlerlike method toward labor ostensibly to advance our conflict with Stalin.

In persuading the Wage Stabilization Board to sponsor the union shop for steel workers, there is every reason to believe that the union leaders have trapped themselves. If the government imposes the union shop, a next step clearly becomes necessary. This is government regulation of the union in order to provide a modicum of protection for the minority that would be forced by the government to join against their will. It could be that for a time the government would ignore this obligation. But, having granted the union the power to eliminate the minority, it would sooner or later be forced to regulate the use of that power. Thus free collective bargaining and freedom itself would be the losers.

An Issue of Basic Principle

Resistance to a government-sponsored union shop for the steel industry is bound to bring harsh denunciation both from the administration and union leaders who have teamed to back it. Not only does the union shop relieve the union leaders of the problem of recruiting members, it also eliminates a group of workers that they stigmatize as "free riders"—namely, those who work for companies which have a working agreement with a union but do not join the union. In the basic steel industry about 10 per cent of those who work for companies with union agreements are not members of the union. Such a small percentage of non-members is obviously no threat to the "security" of the union, although that is what the drive for the union shop ostensibly is designed to protect.

In the reporting of the present labor dispute in the steel industry virtually all of the attention has been focussed on the handling of the issue of a wage increase and how large it should be. This, to be sure, is vitally important. Mobilization Director Wilson has said it is "a serious threat to our year-old effort to stabilize the economy." But certainly of comparable importance is the tremendous issue of principle raised by the government's backing of the union shop for the steel industry.

If the position of the Wage Stabilization Board on the union shop prevails, our government will have blunted the arms we are forging to fight for our freedom abroad by undermining a major bulwark of our freedom right here at home. At this critical time in the struggle to preserve and protect our freedom such a subversive course should be resisted to the limit.

McGraw-Hill Publishing Company, Inc.

ONCE upon a time there were six blind men, each of whom touched a different part of an elephant's body and came up with six different descriptions of it.

It might be well to remember this when considering the purchase of transformers. Unless the manufacturer considers the product's purpose objectively, it is quite possible that over-all performance will be sacrificed. Unbalanced design will not produce the efficient distribution system you are seeking.

Moloney products are designed and produced with your needs in mind. Over 50 years of experience in engineering, research, design and fabrication are combined to produce the best all-around transformers that you can buy. For better performance, greater reliability and less maintenance . . . specify Moloney.

MX-52-11

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EDITORIALS

N.Y. Savings Banks—A New Market for Equities

The signing of the Mahoney-Preller Bill by Gov Thomas E. Dewey of New York has opened a new and rich market for the securities of the electric utility industry. Under the law the 130 savings banks in the state are now permitted to buy "equities" of any corporation created or existing under the laws of the United States or of any state, district, or territory.

The act limits the savings banks to purchases of common, preferred, or guaranteed stocks to 5% of a bank's assets or 50% of its surplus whichever is smaller. These banks had assets of $13.6 billion including $12.2 billion in deposits at the end of January. Surplus and undivided profits, considered surplus under the law, amounted to over $1.3 billion. This means the banks can invest up to $650 million in preferred and common stocks of electric utility companies.

But the common stocks must be registered on a national securities exchange as provided by the Securities Exchange Act of 1934. They also must have paid cash dividends for a period of ten years. Preferred stocks need not be registered but must show net earnings which have covered annual fixed charges by one and one half times for each of the preceding five years.

There are few, if any, electric companies that have not paid common dividends during the last ten years. As far as those listed on the New York Stock Exchange, there are approximately 52 companies that have such a dividend payment record. So the equities of a good number of electric companies may now be purchased by the New York banks.

This law comes at a good time for the industry. With construction expenditures for this year estimated at a record high of nearly $2.7 billion many companies will need to secure more money, preferably from the sale of equities. For the first quarter of 1952, all electric companies sold only $61 million in preferred and $86 million in common stocks. Construction expenditures are slated to stay high. So the demand for money will continue.

For the savings banks these electric companies offer a safe place in which to invest the money entrusted to them by their depositors. The industry has a good record of earnings and dividends. As one consulting firm, specializing in electric utilities, said recently: The present typical common dividend rate is not out of line with modern practice if earnings are adjusted to reflect repeal of the federal excise tax for 12 months. And considering the general level of the economy and the degree in which yields and price-earnings gaps have closed, there are good opportunities for upgrading investments in utility equities.

But electric companies should not wait for this rich market to come knocking at their doors. They must go knocking on the doors of the banks. It must be remembered that the banks are not limited in their purchase of equities to those of electric companies. Thousands of other companies among the nation's other important industries also will be eager to get their stocks into the portfolios of the banks. This can well be another occasion on which the industry should go out and sell.

Let's Study Railroad Electrification

Railroad electrification is static in this country but booming in coal-and-oil-short Europe. Diesel-powered equipment using oil has been supplanting the obsolete, coal-burning steam engine. The diesel has been a sizable factor in stopping electrification programs in the United States.

At the moment there is little that can be done to reverse the trend here. The railroads have been in no position to raise the capital even if they could be convinced of the long-term superiority of electric power. The point to recognize right now is that some inept or desperate railroad management might kill electric operation for all time by replacing electric locomotives with diesels and, God forbid, selling the copper and the steel of the catenary.

Several factors may before too long change the whole economic pattern of electrification. States are already taxing truckers in a punitive way for highway damage. Cities may run out of funds to provide high speed arteries into and parking at the civic centers. Both moves may throw traffic back to the railroads.

Meanwhile, the utilities are hard put to find rights of way for their cross country lines. Both abandoned and active railroad routes have been cultivated for this new use. More could be and then the substation would be right there to serve the railroad electrification. The railroads go where people and industry are and so do the electric utilities. They are parallel functions.

Upshot of all this is that a study should be initiated very soon to explore the possible future of railroad electrification before untoward events happen to destroy any such future. The utilities can well contemplate nationwide railroad electrification as an item in area coverage. The railroads could likewise take stock of the economies of short-term vs long-term equipment, of short-term vs long-term "fuel", and, as well, of the growing disposition of the public to feel that the railroads provide a good way to get where one is going.

To Get Cooperation, Give It

For a number of years the electrical industry has been seeking the cooperation of other industries and from professional groups in its struggle against public power. It has often been pointed out that the other groups are just as liable to seizure by the government as is the utility industry. There is no doubt that this is true. And since it is true, the industry if it is to abide by its own principles must do what it can to preserve the freedom of those upon whom it calls for assistance.

Such thinking must have been behind a recent advertisement of the Pennsylvania Power & Light Co saluting the Lehigh County Medical Society on its 100th anniversary. This could have been merely a nice gesture. But instead the ad carried this message:

"The American medical profession . . . free to think, to act, and to progress . . . leads the world. It has given Americans the best medical care, the most hospitals, the longest life expectancy, and the greatest hope for further progress of all the world's people.

"Today, when certain groups argue for socialized medicine for America—argue for regimented medicine as in England—stop to think for a moment about whose hand you want to guide the scalpel when your life is at stake!"

PP&L evidently believes cooperation works both ways.

Progress in Mercury Vapor

In the five years, 1947-51, the miles of street and highway lighted by mercury lamps were multiplied over six and a half times and the number of lamps in that use an even five times. The figures are 400 miles lighted at the beginning of 1947, 2,675 miles at the end of 1951; the respective numbers of lamps are 26,000 and 130,000.

Laid end to end, the present lengths of mercury-lighted roadway would span the United States from Boston to San Francisco. Or you could drive in mercury effulgence from Skagway, Alaska, to San Antonio, Texas; from Mexico City to Halifax, Nova Scotia. (We hope these distances are right; we're only repeating what we were told.)

But the data are more significant than is indicated by these fanciful "end-to-end" distances. Apart from this record of growth in application, the figures tell an impressive story of technical progress. This progress has been in the lamp itself—ability to operate in horizontal as well as vertical position, increase in output, shorter length of envelope—and in consequence better adaptability to enclosing reflectors and refractors. This is the principal reason why in 1951 the average was 48.6 lamps per mile as against 65 in 1946.

Help the C of C Help the Industry

The Chamber of Commerce of the United States has endorsed Production for Freedom Week. This is wonderful news because it means that this project of the Electric Companies Public Information Program will have the support of the local chambers throughout the country. But if electric companies aren't alert, they may find their local chambers sponsoring celebrations without mentioning the electric industry.

Many local C of C secretaries are former newspaper men who know just about all that needs to be known about getting publicity and about publicizing "weeks." They are go-getters who hold their jobs because they can and do promote their communities and local industries. The electric companies could have no better allies. But these are men of action. If the electric companies do not work closely with the chamber secretaries, Production for Freedom Week may end up being a week of tribute to the steel, aircraft, or the meat industry.

It is up to each electric utility to take this story to the local chambers in its service area:

1. Electric power plays the major role in production in all industries.

2. Modern, electrically driven tools and machinery are responsible for the high productivity of the average American worker.

3. The local company like all the other investor-owned electric utilities can supply all the electric power required for any purpose.

There is little doubt that if the local chambers are properly informed of the industry's part in productivity, Production for Freedom Week will turn out to be the most successful of all the industry's efforts to tell its story to the American people.

THE ELECTRICAL WEEK

Featured in the News

Detroit Edison-Dow Chemical group gets approval from AEC for another year's study of power from atomic energy (p 78) . . . Con Ed substation had to be beautiful as well as efficient (p 79) . . . Truman reverses himself on giving the Army Engineers' civil functions to Interior (p 80) . . . Customers must be convinced of the need for adequate wiring, PCEA is told (p 81) . . . Industry must train future leaders, McManus tells SEE annual meeting (p 82) . . . RMEL sets up an information committee at its spring conference (p 84) . . . Nashville builds an operations center (p 86) . . . Tax reduction plan to offset a recession is being planned by joint staff of Congress' tax-writing committees (p 87).

• • •

Latest from Washington—Donald F. Kigar, Detroit Edison, has been appointed director of Depa's Materials and Equipment Division, succeeding Donald R. McClung. McClung has resigned to return to his duties as Pacific P&L vice president . . . Senate confirms nomination of Thomas E. Murray of New York for a new five-year term as a member of AEC . . . Of 664 applications made for rapid tax amortization certificates for electric power projects, 261 have been approved and 152 denied. Remainder are still pending before DPA . . . Black River Electric Co-operative, Iron, Mo., receives an REA loan of $1.8 million to finance construction of 697 miles of distribution lines, nine miles of transmission lines, and for other facilities.

From New England—Boston Edison gets certificate of honor from Northeastern University for employing students over a period of 40 years in conjunction with NU's work-study program. The scroll reads "In grateful recognition of uninterrupted service to education and the community" . . . United Illuminating Co, New Haven, reports prospective industrial plant loads approximating 26,000 kw in four new installations in New Haven-Bridgeport area.

From West North Central—Northern States Power of Minnesota opposes proposal that Minneapolis levy a fee against the company similar to that under which Minneapolis Gas pays 1.6% of gross sales annually for use of streets. City Council Public Utilities Committee decides to study the matter further . . . Sho-Me Power Corp, which has already sold eight of its operational systems in south central and southeastern part of Missouri, asks PSC approval to sell its system in and around Stanton and Bourbon and outside of Cuba and Sullivan, Mo., to Crawford Electric Co-operative for $70,018 base price, and its distribution system in Houston, Mo., to the city for $108,467 base price.

From West South Central—A 30-year pact between the government, Arkansas P&L and Reynolds Metals Co has been approved by FPC. It covers power rates for proposed $35-million Reynolds' aluminum plant to be built at Arkadelphia. (see page 76).

From East North Central—Bryan, Ohio, City Council agrees to purchase portion of city's power needs from Toledo Edison, rather than install additional generating units at the municipal plant.

From the Southeast—Virginia E&P gets 15-year franchise to supply electricity to Orange, Va.

Financial—Sevier County, Tenn., Electric System completes arrangements to purchase and improve the Townsend Light & Mill Co of Sevierville, Tenn . . . Tampa Electric will sell early in June about 50,000 shares of $100 par preferred and 60,000 shares of common stock . . . Vineland, N. J., has sold $500,000 in electric plant obligation bonds due from 1953 to 1972 at a bid of 100.06 for 1⅝s . . . Jersey Central P&L asks PUC approval to sell its gas properties and franchises to New Jersey Natural Gas for $14,237,424. This bid exceeded the one submitted by South Jersey Gas by $87,425.

Rates—Washington WP reports that a surcharge rate application filed with the PSC has been withdrawn (EW, April 21, p 107). It covered surcharges in the event that an abnormal amount of steam generation would be required if low water conditions prevailed. Water conditions were such that no abnormal amount of steam operations was needed. Therefore the surcharge rate application was withdrawn . . . Arkansas-Missouri Power gets Arkansas PSC approval to increase rates about 6% . . . Massachusetts Department of Public Utilities will reopen $1.2 million rate increase case of Western Massachusetts Electric . . . Seattle City Light Superintendent E. R. Hoffman recommends a reduction of rates that will save its customers approximately $1 million a year.

Litigation—New York Court of Appeals rules PSC can prohibit "submetered" sale of electricity to consumers. On Dec. 28, 1950, the PSC gave Consolidated Edison Co of New York a go-ahead to abolish this practice. Real Estate Board of New York and Midtown Realty Owners Association are up in arms about the decision . . . U. S. Supreme Court is expected to decide within three weeks whether it will listen to the argument over the question of who should build a power plant at Roanoke Rapids, N. C.

Provincial government ownership of Manitoba's hydroelectric industry was thrown out the window by Winnipeg electors, who voted almost 2-to-1 against a plan under which the province would have bought out combined assets of Winnipeg's two power utilities. A referendum vote, the result of which upset a 16-to-1 City Council decision in favor of plan, ended five years of negotiations.

Congratulations—Dallas P&L appoints L. J. Blaize vice president in charge of engineering and system operation . . . Corporation of Professional Engineers of Quebec, Canada, elects Louis O'Sullivan (assistant general manager of Quebec Hydro-Electric Commission) president.

WASHINGTON COMMENT

JESSE MOCK

Back in January everything seemed set for Reynolds Metals Co to build an aluminum plant in Arkansas. Interior Department announced with some fanfare that final power contracts had been signed. But in small type it noted the rates were subject to approval of Federal Power Commission.

Southwestern Power Administration, an Interior agency, was to furnish 150,000 kw of power during certain hours of the day. Arkansas Power & Light Co was to firm up this power and "wheel" it to the Reynolds plant. Rates were agreed on for a 30-year period with provisions for increases every ten years. Reynolds had insisted on the 30-year power contract as a means of securing its investment in the plant.

Rates OK for 5 Years Only . . . Now the Federal Power Commission has issued a decision which puts a big question mark over the whole venture. After months of study, FPC has decided that it can approve the rates only for the first five years of the contract. Then, and every five years after, the rates must be reviewed. They can be raised no more than 10% in the sixth year but can step up to 22.5% for the last five years. Early last week Reynolds was on the hot spot trying to decide whether it could afford to go ahead with the aluminum plant if the rates were not stabilized beyond a mere five years.

While the interested parties tried to assess the implications of the FPC decision, staff members at FPC gave a big sigh that it was made. The case has been one of the warmest political fireballs that FPC has juggled in some years. Arkansas law-makers have been trying for all they are worth to land this new aluminum plant for their home state. SPA and its parent agency, the Interior Department, have pulled all the strings they know to get favorable FPC action. The FPC was constantly reminded that production of aluminum is a defense necessity. In this atmosphere, FPC had to make a decision.

From the outside, it looked as if the five-year approval was an attempted compromise. But that would be up to Reynolds. If the company decided it couldn't accept the short-term power rates, it might turn out that FPC had really tossed a monkey wrench in the plans to put the aluminum plant in Arkansas.

SPA Rates Too Low . . . Heart of FPC's objection to the 30-year rate schedule was the low price SPA proposed to charge for its share of the power. Under the Flood Control Act, FPC must study the rates proposed by SPA, "having regard to the recovery . . . of the cost of producing and transmitting such electric energy, including the amortization of the capital investment allocated to power over a reasonable period of years." Congress has not required that the costs allocated to flood control and navigation be reimbursable.

In failing to approve the full-term contract, FPC was really arguing with SPA over the allocation of power costs of the multi-purpose dams that make up the SPA system. There was considerable feeling among the FPC staff that SPA was overallocating the costs to flood control and underallocating costs to power. This was done, it was argued, so that SPA could bring its power rate down enough to attract an aluminum producer. In its simplest terms, this means that SPA is offering electricity for about 3.5 mills that should bring in 6 or 7 mills.

This would amount to a federal subsidy for the aluminum producer. FPC has no authority to decide whether such a subsidy is justifiable or not in the present defense production. But there is a feeling that the subsidy should not be hidden in the power rates of a federal agency.

The role of Arkansas P&L in this controversy was merely that of an interested onlooker. There was no indication that FPC believed that company's share of the rate was either too high or too low. Reynolds likewise was a vitally interested bystander.

In this case we have the very interesting example of a secondary subsidy. Production of aluminum should be subsidized by low-rate federal power which in turn would be subsidized by the taxpayer.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Junction boxes designed for compact installation of copper conductors will often accommodate aluminum conductors with difficulty unless higher heat resistant cable insulation is adopted to compensate for the differences in diameters.

Motor starting currents are of short duration. Some ammeter damping is such as to prevent a fair reading.

Paper-insulation has almost completely superseded rubber and varnished cambric insulation for cables above 7.5 kv.

Trichlorbenzene added to pentachlor diphenyl results in a capacitor kraft-paper impregnant that has satisfactory corona voltage starting level as low as −94 F.

Harmonics arising from capacitive discharge from generator coil to slot iron can be detected as a voltage drop across any impedance in the generator neutral. Frequency of such discharges is generally higher than the "wave form" harmonics of the machine.

New meters received from the manufacturers should not have to be opened purely for the purpose of attaching the company number badge inside.

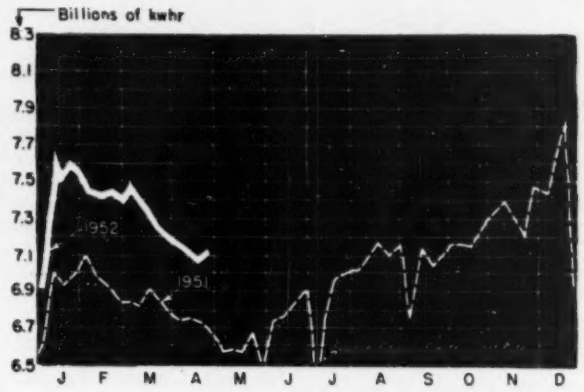
Auxiliary voltage was depressed to 60% but exhauster fan speed dropped only 4% below normal, the induced draft fan 2%, and the pulverizer 4½%.

Conveyor lengths are longer now that nylon or rayon cords or steel wires are imbedded longitudinally in the rubber. Number of drives and transfer points is decreased.

Compressed air can enhance the effectiveness of a protective gap by making it self-clearing.

Titanium will be enhanced in value as a lightweight metal if it can be successfully coated with other metals to compensate for some of its adverse characteristics of surface-softness, non-solderability, etc.

STATISTICS



Output Week Ended April 26—7,140,000,000* Kwhr

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
April 26	+6.9	(Data on regional change not available at press time)								
April 19	+3.6	+4.4	+2.5	+3.1	+5.6	+12.5	+15.9	+5.9	+6.4	—2.1
April 12	+6.0	+2.1	+4.7	+2.6	+5.3	+12.0	+20.5	+6.8	+5.9	—8.6

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load (Million Kw)	Feb.	64.8*	69.0	62.4
Capacity (Million Kw)	Feb.	75.99	75.97	69.42
Production (Billion Kwhr)	Feb.	31.54	34.20	28.22
Hydro		9.46	9.90	8.21
Fuel		22.07	24.30	20.01
Fuel Consumption				
Coal (Million Tons)	Feb.	8.74	9.87	8.59
Oil (Million Barrels)		4.77	6.07	5.57
Gas (Billion Cu Ft)		54.82	52.27	40.50
Sales (Billion Kwhr)	Feb.	29.08	29.72	26.50
Residential		8.51	8.87	7.58
Commercial		4.87	4.99	4.89
Industrial		13.82	13.90	12.64
Other		1.88	1.95	1.79
Net Income Class A & B Utilities ($ Million)	Jan.	86.59	100.82	75.82
Estimated Dec. 52 Peak (Million Kw)*	Feb.	80.5	80.6	78.0
Kwhr per Residential Customer (12 Month Average)	Jan.	2,021	2,004	1,848
Revenue per Kwhr Residential Service (12 Month Average)	Jan.	2.81¢	2.81¢	2.87¢
Canadian Production (Billion Kwhr)	Feb.	4.97	5.27	4.38

Business Statistics

FRB Industrial Production Index†††	Feb.	218*	216	217
Gross National Product Annual Rate ($ Billion)	1st Qtr.	339.0*	334.6	319.5
E. W. 5 Industry Production Index	Mar.	124.4*	124.3	121.6
ENR Construction Cost Index††	April	116.2	115.4	112.9
BLS Consumer's Price Index	Mar.	188.0	187.9	184.5
NEMA Insulation Materials, Sales Index†	Feb.	528	548	552
NEMA Electric Appliance Sales Index†	Feb.	224	233	343
NEMA Household Refrig. Sales Index†	Feb.	153	153	238
Metal Prices				
Copper, Conn. V., lb		$ .24½	$ .24½	$ .24½
Lead, N. Y., lb		.18	.19	.17
Zinc, prime Western E. St. Louis, lb		.19½	.19½	.17½
Tin, Straits, qual. N. Y., lb		1.21½	1.21½	1.42
Aluminum, ingot, base price		.19	.19	.19
Nickel, base price		.56½	.56½	.50½
Steel, billets, Pitts., ton		56.00	56.00	56.00
Steel, scrap, No. 1 heavy, Pitts., ton		45.00	45.00	45.00

* Estimated. † 1936=100 †† 1949=100 ††† 1937-39=100 (Unadjusted)

Fuel Costs Decline During '48-'50 Period

Average cost of fuel per net kwhr fell 16.7% between 1948 and 1950. A new Edison Electric Institute study reveals that this is due to two facts:

1. Btu requirement per net kwhr decreased an average of 10.9%.

2. Cost of fuel per million Btu decreased 7.1%.

Average Cost of Fuel

	Btu per Net Kwhr	Cost per Million Btu	Cost per Net Kwhr
1950	14,027	24.8¢	.35¢
1949	15,033	25.2¢	.38¢
1948	15,738	26.7¢	.42¢

Average cost per million Btu consumed of both coal and oil decreased during this period. Cost of gas rose.

Average Cost of Fuel Per Million Btu

	Coal	Oil	Gas
1950	26.9¢	31.8¢	12.1¢
1949	27.1¢	34.2¢	11.8¢
1948	27.9¢	45.3¢	10.5¢

Regional data indicates that the average cost of fuel per net kwhr is greatest in New England, 0.50¢ in 1950. Here the average cost of coal, 36.0¢ per million Btu in 1950, is the nation's highest. This is in fact greater than that of oil, which was 32.9¢ in 1950.

Average Btu Content

	Coal (lb.)	Oil (bbl.)	Gas (cu.ft.)
1950	11,839	149,699	960
1949	12,011	149,843	1,046
1948	11,980	147,653	1,053

West South Central region enjoys the lowest cost per net kwhr, 0.11¢ in 1950. The cost of gas in this region, 7.5¢ per million Btu consumed, is the lowest of any fuel in any region.

This report reveals that the average cost per ton of coal to the electric utility industry was $6.38 in 1950. Highest regional cost was $9.89 (New England). Lowest, $4.49 in the West South Central region.

Nationwide cost of oil burned under boilers and by internal combustion engines was $2.00 per barrel in 1950. Cost of oil was highest to the utilities in the East North Central region, $3.58. Utilities in Pacific region enjoyed the lowest cost, $1.35.

Average cost of gas was 11.6¢ per thousand cubic feet during 1950.

Detroit Edison Continues Atom Study

- **Michigan utility and Dow Chemical Co receive AEC approval to extend research on nuclear-fueled power plants for year**
- **Two firms put up $250,000 to finance development work on reactors and chemical separation processes**
- **Interim reports of private groups working with AEC indicate "cautious optimism" that problems can be solved**

Stakes are high in the atomic power poker game. The winners stand a chance of getting in on the ground floor of the nuclear-fueled electric power business.

Last week a two-company team, Dow Chemical Co and Detroit Edison Co, put up another quarter million dollars to stay in the game for a second round.

This was announced by T. Keith Glennan of the Atomic Energy Commission at the annual meeting of Southeastern Electric Exchange in Boca Raton, Fla. (Complete coverage of the SEE annual conference on page 82).

Dow-Detroit Edison is one of four teams of industrial and utility firms now working with Atomic Energy Commission to find a way to produce commercially feasible electric power from atomic energy.

Cautious Optimism . . . Interim reports are now in from all four teams. They indicate: "A cautious optimism that the difficult technical and cost factors involved will be solved eventually."

This conclusion is shared by the Dow-Detroit Edison team which now has AEC approval to continue the study for another year. This will include additional research and development work on both reactors and chemical separation processes, but will not provide a final reactor design. Cost to the companies for the extended studies is estimated at a quarter of a million dollars. During the same period, AEC expects to spend about three times that much money on the same general type of study.

Will Consider Other Proposals . . . Acceptance of this proposal does not mean that the three other teams are out of the picture. AEC will consider proposals from the other teams as soon as reports on present studies are submitted for action.

"Significant fact is," said AEC Commissioner T. Keith Glennan, "that one of these combinations of companies has decided that, as of the present moment, the prospects of economic atomic power are sufficiently promising that it will continue to spend its own money both to expedite developments and to keep itself currently informed on the total program."

Although it has not yet released the interim reports, AEC is evidently pleased with the studies so far. It recently invited other firms to submit proposals for participating in power feasibility studies similar to those now in progress.

Sets Up Agency . . . Last week, AEC set up an Office of Industrial Cooperation to foster wider industrial participation in the Atomic Energy Commission program.

Heading the office will be William L. Davidson, 38, who resigned his post as director of research for the B. F. Goodrich Rubber Co to take the new job. A Yale-graduated doctor of nuclear physics, Davidson attended the first session to be held at the Oak Ridge School of Reactor Technology.

PUD Gets Federal OK for Box Canyon Project

Federal agencies have given the green light to Public Utility District No. 1 of Pend Oreille County, Wash., for its Box Canyon development.

By failing to act on Interior Department's application for a rehearing in the case, Federal Power Commission has reaffirmed the license granted to the PUD for the 60,000-kw project costing an estimated $16 million.

To aid in financing, Reconstruction Finance Corporation has approved a loan of $16.8 million to be secured by electric revenue bonds.

CIO Starts MVA Campaign

CIO industrial union councils across the nation last week began a campaign to promote legislation leading toward establishment of a Missouri Valley Authority.

The campaign was launched by Anthony W. Smith, executive secretary of the CIO Committee on Regional Development and Conservation. He called for a "sound and constructive" program for the Missouri Valley to overcome the "irresponsible neglect of the resources of the region which has thus far prevailed."

The CIO, he said, is backing a combined program of watershed management and reasonable dam building for hydroelectric power and supplemental flood control.

Not "All-or-Nothing" . . . "CIO has for many years urged an MVA," a union spokesman pointed out. "However, we don't want to make MVA an all-or-nothing thing. Anything that moves toward MVA we'll support, and anything that moves against MVA we'll be against."

The type of watershed management program that should be set up, Smith said, is one such as the Department of Agriculture has recommended. This would include a number of check dams on the upper tributaries, soil conservation, and reforestation.

"These measures," he commented, "will hold back most of the flood waters. The remaining problem can be taken care of by dams for hydro power and supplemental flood storage."

He said the Army Corps of Engineers and Bureau of Reclamation had "failed completely" in controlling the disastrous floods in the Missouri Basin. The President's Missouri Basin Survey Commission, he suggested, should hold hearings and make recommendations promptly to develop a "tangible" program.

BOROUGH PRESIDENT of Manhattan Robert F. Wagner, Jr, turns the switch placing Consolidated Edison's 19th Street Substation in service after getting last minute instructions from operator Rene Marchand. H. R. Searing (center), Con Ed president, watches the proceedings

Substation for Busy New York District

Consolidated Edison Co places West Side distribution station in service to meet increased demands of the area

Consolidated Edison Co of New York recently placed in service a substation on New York City's West Side to meet the increasing demand for electricity of the rapidly growing business district.

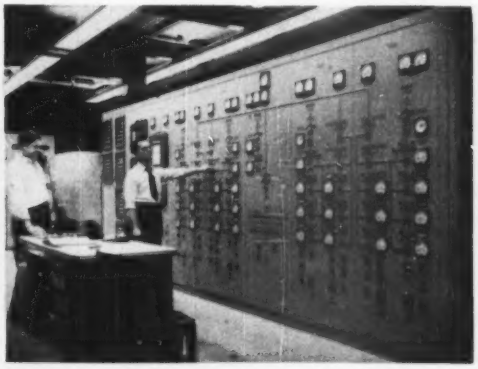
The substation, housed in an attractive orange brick structure, has eight feeders and a rating of 180,000 kva. Power sent out from the company's East River Plant at 69 kv will be stepped down at the 19th Street Substation to 13.2 kv before being fed into the district served by the substation.

Suggestion Adopted . . . Since the substation was being erected in a business and residential district, Con Ed endeavored to make the building fit in with its surroundings. The low brick building has pleasing architectural lines and contains large display windows. Originally the company had not planned to install the windows. But when civic associations in the area suggested that blank walls would detract from the building's appearance, the company put the windows in.

Con Ed now is planning to incorporate display windows in a new substation it is building on New York's East Side.

The 19th Street Substation was placed officially in service at 11:40 a.m. April 23 by Manhattan's Borough President Robert F. Wagner, Jr. The ceremonies were attended by other city officials and by Consolidated Edison executives.

EXTERIOR of substation features display windows. Company made station as attractive as possible to fit in with surrounding area



OPERATORS Theodore Leighton (left) and Rene Marchand make check of the equipment in the control room of the 180,000 kva substation

Truman Drops Corps Change

In a sudden shift last week, President Truman pulled the rug from under the Hoover Commission plan for transferring Army Corps of Engineers' civil functions to the Interior Department. He directed budget director Frederick J. Lawton to stop work on the plan, which would abolish Reclamation and create a new Interior agency to combine reclamation work and the Corp's civil functions.

For all practical purposes, Truman's surprise decision killed the plan outright. Only a miracle could revive the proposal before the Government Reorganization Act runs out. April 1, 1953, is the deadline date for submitting plans to Congress.

Chances that Truman's successor will do anything about the plan within that time are practically zero. The winner of next November's presidential election would have to be firmly sold on the idea before he takes office Jan. 20. There are no candidates in sight with strong convictions in favor of the plan.

Most of them would lean the other way—in favor of keeping flood control and navigation projects under the Army Engineers. Eisenhower, for one, has spoken out in the past against stripping civil functions from the Corps of Engineers.

Addition to Rise in Ohio

Walter H. Sammis, right, president of Ohio Edison Co, sifts earth from the first shovel full ceremonially turned over at the groundbreaking for the 270,000-kw addition to the steam plant near Bellaire, Ohio, named for R. E. Burger, left. Burger is a member of the company's board of directors. When addition is completed, plant's capacity will be raised to 500,000 kw.

POWER BRIEFS

● Contracts for construction of the Palisades Dam and power plant on the south fork of the Snake River near Idaho Falls, Idaho, have been let and work on the Bureau of Reclamation project is expected to start this month. The power plant will have a capacity of 114,000 kw and first generation of power is scheduled in about 1,700 days.

● Columbus & Southern Ohio Electric Co has placed the third new 60,000-kw generator in operation at its Post Station. A fourth 60,000-kw unit is scheduled to go on the line in October 1953.

● The Sacramento, Calif., Municipal Utility District now is serving its 100,000th customer. This represents an increase of more than 53% over the 65,219 customers receiving electric service when the district began distribution operations Jan. 1, 1947.

● An honest but retiring customer of Potomac Edison Co paid back the utility $2 he felt he owed it. The money was enclosed with a brief note, "For electricity used during the depression," made up of words cut from newspapers or magazines.

● An order to cut use of electricity 20% is in effect in Buenos Aires, Argentina. Householders have been warned that they may be deprived of power for a month if they ignore the restriction.

● Hawaiian Electric Co will begin construction on a $10-million power plant next year in downtown Honolulu on a site adjoining its present 100,000-kw plant. The company hopes to have the first 50,000-kw unit on the line in 1955. A second 50,000-kw unit will be added later.

● Wisconsin Power & Light Co recently received the first place award of the National Safety Council for its outstanding employee safety record. The presentation was made by Gov Walter J. Kohler to Grover C. Neff, the utility's president. The company also won first place in the Bureau of Safety employee accident prevention contest and first place in the Wisconsin Motor Vehicle truck fleet contest in the utilities section.

SPEAKERS and chairman get together at PCEA Business Development Section annual conference. They are (l to r) H. C. Rice, Southern California Edison, section chairman, and O. R. Doerr, Pacific G&E, and R. C. McFadden, Southern California Edison, who addressed meeting

PCEA Hears Talk on Wiring

McFadden tells Business Development Section that subsidies are a poor substitute for a constructive selling campaign

To break the electrical industry's biggest bottleneck we must convince our customers that "the house with inadequate wiring is as out of date as the house with a path instead of a bath." R. C. McFadden, Southern California Edison Co vice president made this recommendation to the Pacific Coast Electrical Association Business Development Section annual conference in Pasadena April 24-25.

He called wiring subsidies a poor substitute for constructive selling of adequate wiring, and showed how continued sale of the host of new major appliances is dependent on renewed efforts to break the bottleneck.

Mass Selling . . . C. W. Leihy, Electrical Publications Inc, told another luncheon group that mass production of prospects, interest in the product, and actual sales closings were the only answer to the vastly increased mass production of major appliances which is actually here today. He suggested adaptation of such mass selling techniques as self service and tape recorded or sound filmed pre-selling presentations at point of sale. Piecemeal selling will be totally inadequate, he said, and sales forces from management on down should be retrained to think in terms of multiple sales of thousands instead of hundreds of dollars. Only in this way, he concluded, can we realize the $7.5-8 billion annual potential of a mass production appliance market.

Among the factors contributing to marked improvement in school lighting installations in northern California, J. E. Barnes, Pacific Gas & Electric Co, listed the following: Greater concentration on essentials and use of basic visual information available in school house design, general standardization in incandescent jobs on silver bowl lamps with ring louver suspension fixtures, use of luminous or indirect units instead of industrial or store lighting fixtures, the beginnings of mutual research projects affecting school lighting.

Lighting Program . . . Details of a cooperative program by which all segments of the home lighting industry are telling the story of light conditioning through the Los Angeles Electrical League were presented and discussed in the Home Lighting group. The league is furnishing window banners and coordinating publicity (including television programs), distributing brochures, and furnishing a speakers bureau for architect and builder groups, all to tell the story of light conditioning and adequate wiring.

Pre-planning industrial customers' power requirements, power factor, type of distribution, and general lighting are valuable services which the utilities and electrical contractors should be able to furnish on request, W. A. Bouve, Southern California Edison, told the Commercial-Industrial group. Better design and application of motors to cut the amount of idling load was one of the means discussed to help the customer get maximum utilization of his power capacity.

Power Failure Dims A-Bomb Blast Telecast

Why the A-bomb explosion telecast April 22 didn't come up to expectations was an interesting sidelight of the Television Committee discussions at the Pasadena PCEA meeting April 24-25. Here is the story according to representatives of two of the seven Los Angeles stations which cooperated to cover the event: After AEC notified them the event was available for telecast, the stations spent three weeks putting in microwave links from the site to Los Angeles. Three cameras were installed at News Knob, seven miles from the explosion site, and two standby cameras on Mt Charleston, 40 miles from the site. The equipment was put in operation and a signal transmitted to Los Angeles a week before the event.

After a continuous run of 48 hours without an interruption, power failed at the three cameras at News Knob two minutes before the explosion, and wasn't restored until after the explosion occurred. The actual explosion was covered by the two standby cameras 40 miles away—explaining the small image—followed later by a close up of the post-explosion cloud.

What caused the power failure? No one wants to be quoted, but unofficially it is said a truck ran over and severed a power cable!

CONGRATULATIONS are extended by retiring SEE president C. B. McManus, left, to incoming president H. C. Leonard, vice president, Gulf States Utilities. Looking on are J. W. Talley, SEE managing director, and new officers: M. C. Funk, first vice president and vice president, general manager, Appalachian Electric Power; and L. C. McClurkin, second vice president and president, Savannah E&P

SEE Discusses Leadership Problems

In president's annual report, C. B. McManus tells conference that the failure to train adequately future officials to succeed present utility executives is a potential danger

A harmonica lesson for George Gadsby and a warm smile was McGregor Smith's inimitable way of opening the annual conference of the Southeastern Electric Exchange held at Boca Raton, Fla., April 21-23.

C. B. McManus, president of SEE and Southern Co, was extremely optimistic over the future of the industry but pointed out two areas of potential danger. These he listed as "not taking advantage of the opportunities that are ours" and "failing to train adequately those who are going to succeed us."

Leadership Problem Stressed . . . "The problems of leadership in our industry are going to become more and more complicated," McManus declared. "There is much more danger in doing too little in the training job than there is doing too much."

The leadership problem was discussed further by Ernest R. Acker, president of Central Hudson Gas & Electric Corp. He described his company's executive and supervisory training and development program. The utility's experience first with a survey of supervisory and employee opinion conducted by an outside consultant and then with the training program itself has been highly satisfactory, Acker said.

Charles E. Wilson, former director of Defense Mobilization, gave an off-the-record report on the Washington scene and provided one of the outstanding and stimulating features of the conference.

"No other group is spending so much" as the electric and gas utilities, and "these dollars are just 'American Plan' investor dollars," declared George Gadsby, Edison Electric Institute president. The theme of his address centered around the accomplishments of the electrical industry in handling its mobilization job.

178 Million-Kw Capacity Seen . . . Generating capacity of 178 million kw by 1965 was forecast by A. C. Monteith, vice president in charge of engineering, Westinghouse Electric Corp. As solutions to the problems of such growth in installed capacity, Monteith suggested greater turbogenerator and transformer sizes, breaker ratings to keep step with system requirements, higher transmission voltages to 400-kv or 500-kv range, and use of economies in standardization of equipment.

T. Keith Glennan, member of the U. S. Atomic Energy Commission, announced that the commission has accepted the Dow Chemical Co-Detroit Edison Co proposal for studies and development work on reactors for the production of fissionable materials and power. Glennan felt it to be a significant fact "that one of these (four) combinations of companies has decided that as of the present moment, the prospects of economic atomic power are sufficiently promising that it will continue to spend its own money both to expedite developments and to keep itself currently informed on the total program."

Glennan also pointed to the cooperation of 20 leading universities in the South which, on their own initiative, set up the Oak Ridge Institute of Nuclear Studies. The North Carolina State College nuclear reactor is expected to be in operation before the end of this year.

OPENING ADDRESS at SEE meeting is delivered by George M. Gadsby, president of Edison Electric Institute and Utah Power & Light Co

LOOKING OVER paper presented at conference are Paul D. Brooks, Ebasco Services, Inc, left, and John J. Huether, General Electric Co

Discusses Rate of Return . . . There is no basis for assuming that cost of money or capital to a utility measures the fair rate of return to which the utility is entitled, according to Ralph E. Badger, Associate Standard Research Consultants, Inc. He presented data to prove his theory and maintained that "any determination of fair rate of return under 6% is not a fair rate of return—it is simply the 'cost of money or capital.'"

Speaking for W. C. Mullendore, president of Southern California Edison Co, George Hawley, assistant to the president, said, "The great task before us now is not that of protecting our freedom but of regaining and restoring it. We are no longer citizens but have been transformed into subjects of an all powerful government which, through powers obtained by violating the Constitution in the name of welfare and reform and under the cover of war and national defense, is now exercising the power to direct and control our life, liberty, and property."

Paul D. Brooks, Ebasco Services, Inc, pointed out that, "Today's high construction and operating costs make it almost mandatory that utilities sell as they have never sold before to provide sufficient net profit to attract needed new money into the business."

The full use of a customer with a five-room house now requires 12,000 kwhr per year and 18,600 kwhr with a heat pump. This compared with the present average of 2,000 kwhr per customer shows the tremendous sales opportunities which lie ahead, Brooks stated.

Production Rise Forecast . . . Looking ahead to the future economic growth, John J. Huether, manager of electric utility sales department, General Electric Co, foresaw a rise of 20% in the growth of national product by 1960, an increase from $5,000 to $5,800 average yearly income per employed person, and an increase of 18% in industrial production. This he believes will require 70% more kwhr than produced in 1951. This forecast is that on which General Electric is basing its plans and its investments.

James H. Polhemus, president, Portland General Electric Co, reviewed the power situation in the Northwest. Referring to the relations among various power suppliers he said, "We are finding that relationships between one another have a strong tendency to improve." In discussing the power supply situation he pointed out, "The average residential customer served by my company has increased from 1,518 kwhr in 1940 to 5,543 kwhr at the end of 1951."

New Officers . . . The following officers were elected to serve from July 1, 1952 to June 30, 1953: H. C. Leonard, vice president, Gulf States Utilities Co, president (EW, April 28, p 28); M. C. Funk, vice president and general manager, Appalachian Electric Power Co, first vice president; L. C. McClurkin, president, Savannah Electric & Power Co, second vice president; and Harllee Branch, Jr, president, Georgia Power Co, third vice president.

Lighting Award Winners Announced by NEMA

Winners of the Gold Seal Awards of the Fourth International Lighting Exposition have been announced by the National Electrical Manufacturers Association. NEMA's Industrial and Commercial Lighting Equipment Section is sponsoring the exposition and conference being held this week in Cleveland.

Utility lighting and power representatives who received the Gold Seal Awards were: James F. Finn, Detroit Edison Co, lighting for machine shop; Vincent D. Mitchell, Rochester Gas & Electric Corp, bank lighting; Roger W. Renkel, Union Electric Co of Missouri, with E. W. Stohlmann, Jr, lighting for railroad freight station; Duncan Preston, Detroit Edison, with Floyd Sell, lighting for judging fur-bearing animals; Richard A. Masterson, Public Service Electric & Gas Co, with E. T. Brown, architect, classroom lighting; and Harry L. Nicol, General Electric Supply Corp, with Larry R. Nall, woman's accessory shop lighting.

MEETING REPORT

RMEL Starts Information Group

Committee holds inaugural meeting at League's Spring Conference, sets up speakers' bureau and charts program

Inaugural meeting of a new Information Committee and extended discussion of every phase of television highlighted the spring conference of the Rocky Mountain Electrical League in Denver April 21-22.

The conference also heard J. E. Loiseau, president of Public Service Co of Colorado, denounce as rank discrimination the present interpretation of the public preference and priority clause which deprives 80% of the nation's electric consumers of their equal right to power generated in federal projects paid for by all taxpayers.

Services Stressed . . . The first meeting of the newly formed Information Committee stressed the services which it will make available to league members. Chairman W. L. Breslin, Western Public Service Co, described it as a storehouse and clearing house for materials such as films, prepared scripts, chart talks and panel board talks, and information on employee programs. One of the most important functions of the committee will be its speakers' bureau, which will furnish well-prepared, competent speakers for appearances before service clubs, civic groups, schools, and lodges.

End of the freeze on allocation of new television channels stimulated widespread interest in the many problems of bringing TV into an area for the first time. It provided subject material for full half-day sessions of both the Engineering Committee and a joint meeting of the Sales and Promotion, Television, and Adequate Wiring Committees. W. J. Dolde, Public Service Co of New Mexico, and W. A. Huckins, Utah Power & Light Co, both reported that their companies had been unable to determine that television increased kilowatt hour consumption in the home. Huckins pointed out that TV almost automatically eliminates the radio load during viewing periods, and generally results in a 100-200-w decrease in lighting load. Dolde cited low voltage as the most common cause of complaints, but warned that in many cases dealer service men would try to pass the buck by blaming low voltage or utility interference when the trouble was actually in the set itself.

Dealer's Recommendations . . . A. W. Bernsohn, managing director of the National Association of Radio-Television Dealers of America, Chicago, told the joint meeting that one successful dealer made these recommendations to those about to take on TV: Concentrate on a few lines, and be sure you carry adequate stock; keep your TV in a separate part of the store from white goods for most effective display; put in the best possible multiple antenna installation so you can demonstrate your set's best performance; don't make a step-child of white goods—when the boom ends you will want the diversification they offer.

Favorable climatic conditions with little moisture or industrial contamination were credited by H. H. Tureman, Southern Colorado Power Co, for satisfactory performance of aluminum conductor using unorthodox construction practices on their system. He reported that some service taps where copper conductor has been wrapped directly over aluminum armor rod without even preliminary cleaning were still in service and showed no signs of deterioration after 8-10 years.

R. C. Lane, Aluminum Co of America, in answer to a question from the floor, observed that aluminum can be strung the way copper should be strung.

Now you see the intake, now you . . .

Omaha Public Power District's intake on the swollen Missouri River was just barely awash when this picture was taken April 10.

. . . don't

One week later it was deep under water as the crest reached 30.8 ft.

PUBLIC RELATIONS & ADVERTISING

Carrier Buys Stock and Becomes VIP

A 15-year-old news boy for the "Sheboygan Press", who thought it would be wise to invest his savings in Wisconsin Power & Light Co. common, recently found himself a very important person. His purchase of five shares helped the company to cross the 50% mark in home ownership. Now half the company's stock is owned by residents of Wisconsin.

Special ceremonies were held at Sheboygan at which the boy, Wilbert Nack, received his stock from M. H. Frank, executive vice president. At the left in the picture above is P. H. Fischer, Sheboygan district manager, and at the right is Albert Toepfer, chairman of the company's Sheboygan stockholder committee.

Two other high school boys and two enrolled in grade school who also were recent purchasers of stock were honored at the same time.

Florida P&L Co Gives Meeting Notice Color

Attractive annual reports are commonplace in the electric utility industry. But Florida Power & Light Co has now extended attractiveness to its announcement of the annual stockholders' meeting.

The notice sent announcing the meeting of May 12 was a four-page, 8½ by 11-in. folder. Its red, white, and blue cover heralded Florida as "a sound state with a sound and expanding economy." It depicted the growing industries of the state such as: chemicals, shipbuilding, plastics, electronics, aviation, apparel, and minerals.

The informal letter from Pres McGregor Smith and an article on "A Florida Utility's Good Neighbor Policy" on the other three pages were printed in blue ink. A "plug" for the "mild Florida summers" was inserted on the last page.

Recognition of the increasing number of women stockholders is given as one reason for the improvement in appearance and the friendly message from the president.

The regular proxy and proxy notice were inserted inside the cover, and the whole packet was mailed in a 9 by 12-in. envelope.

'Freedom Production' Gets C of C Support

The Chamber of Commerce of the United States has endorsed Production for Freedom Week, a project of the Electric Companies Public Information Program. The week will be observed Sept. 7 to 13.

Arch N. Booth, executive vice president of the chamber, has asked all local chambers to participate. "Production for Freedom Week is designed to promote economic understanding," he advised. "It is a 'hook' on which to hang local efforts to build better understanding of private enterprise, better appreciation of the role of your business firms in the unique American system of Production for Freedom'."

AD COPY THEMES

Alabama Power Co—"Forsake not an old friend," the company advises in reporting that while 41 new industries were brought to Alabama in 1951, the old established industries are still important.

Consolidated Edison Co of New York—"Picture all this for 19¢ a day!" is testimonial of a customer used to headline an ad playing up the low cost of electricity. The illustration is a picture frame enclosing nine appliances and lighting fixtures with their time use marked.

Pennsylvania Electric Co — "I'm stumped," says Reddy Kilowatt sitting on a stump, "and I'll have to ask for your help!" The ad regrets that "rising costs require increased electric rates." It is also emphasized that while costs have risen 93% in the last ten years, the new rates will be less than those of 1941.

Pennsylvania Power & Light Co—Ad salutes the Lehigh County Medical Society on its 100th anniversary and points out the dangers of socialized medicine (See editorial on Page 74).

Annual Report Highlights

Central Illinois Public Service Co declares, "The average cost of producing a kwhr of electricity in 1951 was 15.5% less than it was in 1948.

Duquesne Light Co has a chart on operating results in terms of percent of 1939 operations . . . **Rochester Gas & Electric Corp** has an attractive cover showing where all its hydro dams are located . . . **Union Electric Co of Missouri** gives a good historical account of its "50 Years of Service."

El Paso Electric Co dedicates its annual report to its 50th anniversary. Then and now pictures are featured . . . **American Gas & Electric Co** has an interesting page spread on "Highlights of 1951" and "Statistical Highlights." . . **Hilo (Hawaii) Electric Light Co** reports moving its floating power plant, "Fort Dearborn," to its permanent location at the Wauakea steam plant.

EIGHT-ACRE SITE for Nashville Electric Service's new centralized operations center provides room for six integrated units in downtown area

Nashville Builds an Operations Center

Municipal system's new $2,836,000, heart-of-city headquarters combines services formerly located in 8 locations. Building has many innovations, including two-level approach

Nashville Electric Service is putting finishing touches on a $2,836,000 electric center. The organization has operated for a number of years from eight scattered locations under many handicaps.

The new operations center, just six blocks from the heart of the downtown business area, features electric heating, air conditioning, cooking and refrigeration. The building is topped by an illuminated dome and a 100,000 candlepower revolving beacon. The beacon will be visible from the hills which circle Nashville and is expected to become a landmark in the city. The dome is lighted by 24, 200-w flood lights installed in the roof of the lantern, one of the few instances where a dome is lighted from above.

Electrically heated ramps to the car storage area have thermostatic controls to prevent ice formation in winter. Automatic finger-touch controls act as safety stops on overhead rolling steel doors.

Integration . . . The new electric center, located on a spacious eight-acre site provides ample room for six integrated units:

- Pole yard, outdoor storage and railroad spur track.
- Transformer shop with crane shed, work pit, paint shop, tool sheds and storage areas.
- Warehouse, car storage in subbasement, with adjacent purchasing department offices, loading docks and material cages.
- Drive-through garage, with car and truck storage, shops, office, washing and greasing facilities.
- Operations building—locker facilities, operating, service, engineering, executive and accounting departments and lunch room.
- Customer service building for all customer-contact and promotional departments, display room and assembly hall seating 360 people.

The non-office areas are equipped with industrial-type electric heaters and positive ventilation. Special ducts and forced draft fans will serve areas subject to gas fumes. An electric boiler will supply hot water to coils in six centrally located fan rooms in the operations and customer service sections. This heating system will be supplemented by unit wall-type heaters in each room. Offices will be cooled by a centrifugal compressor. Air passing through the fan rooms, whether warm or cold, will be filtered by electric precipitators and mechanical filters.

Two-Level Service . . . Four areas provide off-street parking for 165 employees' cars. Customer parking is at the level of a viaduct on which the building fronts, while streets which run under the viaduct will carry service traffic to and from the center.

Pull-in windows can be cleaned by a $7-a-day janitor instead of a $25-a-day window cleaner. —**Allen Pettus**

Tax Reduction Being Weighed

Joint staffs of Congressional committees planning cut if current soft spots in business develop into a recession

A tax reduction plan designed to offset a recession is being prepared by the joint staffs of the tax-writing committees of Congress. It will emphasize private investment in new plants and equipment as a way of off-setting declining expenditures for arms.

The plan will be put before Congress next year in case current soft spots in business develop into a broad recession. Congressional leaders of both parties are thinking about the possibility of a $6-billion slash, which would put rates on corporations back to the levels prevailing after the first post-Korea increase. A few—like Rep Daniel Reed of New York—are talking about a $15-billion slash all the way back to 1949 levels.

The excess profits tax would probably be killed or sharply reduced as a first step. It will take about $2.7 billion from corporations this year. Key Congressional tax experts feel a lot of this would go into construction if the levy were killed.

Tax Showdown . . . The next administration can't avoid a tax showdown next year. The excess profits tax, for example, runs out June 30, 1953. Then on Dec. 31 the personal income tax increases in the Revenue Act of 1950 will end. And on April 1, 1954, the normal and surtax increases imposed on corporations in 1951, will expire.

These cut-off dates mean the new administration will have to go to the mat with Congress on taxes before its first fiscal year is ended. It doesn't make any difference which party wins in November. Tax-cutting will become a major issue regardless of who wins.

Congressional leaders think reductions are a strong likelihood if a recession develops. Both parties have a tradition of having cut taxes in order to stimulate business. The Republicans did it after World War I in the face of a sizable public debt. The Democrats did it in 1945, specifically for the purpose of forestalling a depression.

Tax collections are running behind schedule for this fiscal year. After the big March payments were in, receipts were $1.5 to $2 billion behind schedule. If they don't catch up between now and the end of the fiscal year, June 30, tax cutters will take it as a sign for a reduction.

Better Business . . . Government economists still predict that business will improve by the end of the year. This would dim the chances of a cut for corporations. But it would not eliminate the chance of a cut in personal taxes. Tax-cutters would argue that a lessened load on consumers would be one way to keep business good in a period of declining governmental spending.

Treasury experts don't take talk of reducing taxes seriously. They still stress the possibility of inflation, rather than recession. Some of these are guessing that neither party will significantly reduce taxes in the face of the country's military responsibilities. But observers in government circles outside the Treasury admit that cuts are likely next year.

Heads PUC

Harold A. Scragg, Scranton, who has been a member of the Pennsylvania Public Utility Commission since 1945, has been named chairman.

Electric Bond & Share Plan Filed With SEC

Electric Bond & Share Co has filed a final comprehensive plan with the SEC which is designed to achieve complete and prompt compliance with the Public Utility Holding Company Act of 1935.

EB&S will retain its investments in American & Foreign Power Co and Ebasco Services, and about 9.9% of the common stock of the United Gas Corp. It will make investments which in the judgment of its directors present promising opportunities, in accordance with the fundamental program first described to stockholders in 1945.

The plan provides that EB&S will pay semi-annual dividends in 1952 in the Southern Co and Washington Water Power Co stock in amounts approximately equal to earnings. Any stocks not required for dividend payments will be sold. It will reduce its holdings of United Gas stock to 1,171,000 shares, below 10% of the total outstanding.

It is expected that American Power & Light Co will distribute its principal assets, the stock of Washington Water Power Co, to the American stockholders, soon, the company said.

FINANCIAL BRIEFS

Public Service Co of New Mexico has sold $1.5 million first mortgage 3¾% bonds due 1982 to three insurance companies. These companies have agreed to buy $2.5 million more of the bonds by Feb. 26, 1953 . . . Carolina Power & Light Co has sold 50,000 shares of $5 preferred stock to 15 institutions . . . Blyth & Co has made a secondary offering of 10,000 common shares of Puget Sound Power & Light Co at $19.50 per share.

Stockholder subscriptions—Wisconsin Power & Light Co's stockholders took 207,674 common shares of 288,208 offered on a 1-for-7 basis at $17.15 per share; balance of 80,534 shares were taken by Smith, Barney & Co and Robert W. Baird & Co, underwriters. The company's other offering of 15,000 shares of 4.80% preferred stock at $101.50 (4.73% yield) was oversubscribed.

Today in Utility Finance

YIELDS (%)

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1952									
April 24	2.93	2.96	3.10	4.03	4.26	4.61	5.41	6.06	6.39
April 17	2.93	2.96	3.11	4.04	4.26	4.64	5.47	6.06	6.54
1st 1952	2.95	2.99	3.13	4.11	4.29	4.66	5.35	6.03	6.47
4th 1951	3.02	3.07	3.21	4.32	4.50	4.91	5.42	6.18	6.84
3rd 1951	2.87	2.91	3.04	4.05	4.27	4.61	5.52	6.24	7.05
2nd 1951	3.02	3.11	3.23	4.11	4.37	4.68	5.73	6.30	7.37

Data: Reg & Chandler, Inc.

EARNINGS

Company	Period Months	Ended	Net Income 1952	Net Income 1951	Earnings Per Common Share 1952	Earnings Per Common Share 1951
Alabama Power	12	Mar.	$11,490,787	$9,836,192	$	$
Consumers Power	12	Mar.	19,900,102	20,118,457	2.68(a)	2.98(a)
Detroit Edison	12	Mar.	15,910,344	16,426,393	1.67(a)	2.03(a)
Florida Power & Light	12	Mar.	6,619,796	6,418,696	2.52	2.44
Georgia Power	12	Mar.	10,459,878	9,223,259	....	....
Gulf Power	12	Mar.	1,352,091	1,128,093	....	....
Houston Lighting & Power	12	Mar.	7,423,023	6,478,215	....	....
Minnesota Power & Light	12	Mar.	3,312,845	3,443,810	3.18	3.34
Mississippi Power	12	Mar.	1,939,300	1,615,347	....	....
Mountain States Power	12	Feb.	1,417,145	1,443,057	....	....
Niagara Mohawk Power	12	Mar.	22,555,887	19,414,160	1.93(a)	1.90(a)
New York State Electric & Gas	12	Mar.	6,820,983	5,929,507	2.41(a)	2.28(a)
Pennsylvania Power	12	Mar.	1,897,929	1,653,475	....	....
Portland General Electric	12	Mar.	3,494,768	3,459,869	2.80	2.76
Southern Co, Consolidated	12	Mar.	18,471,961	15,748,157	1.15(a)	1.03(a)
			1951	**1950**	**1951**	**1950**
Central & South West, Consolidated	12	Dec.	$11,398,302	$11,520,112	$1.34(a)	$1.44(a)
Citizens Utilities	12	Dec.	639,850	533,200	2.25(b)	1.88(b)
Idaho Power	12	Dec.	3,262,604	3,139,999	2.87	2.79
Kansas Gas & Electric	12	Dec.	2,760,868	2,858,342	2.84	3.13
New England Gas & Electric, Consolidated	12	Dec.	2,387,647	2,627,075	1.22(a)	1.52(a)

NOTES—The figures shown for the last five companies have been audited; (a) On shares outstanding at end of each period, and (b) Based on shares outstanding at Dec. 31, 1951.

FINANCING

Company and Description	Amount of Offering (000)	Offering Price	Yield to Public
WEEK OF APRIL 24-30			
Bonds			
Union Electric Co of Missouri—1st mtg 3¼% 1982	$30,000	101.931	3.15%
Common Stock			
Indianapolis Power & Light—196,580 sh (being offered to commonholders on 1-for-7 basis (a), record April 10 to expire April 24)	$6,831	$34.75	5.76%
WEEK OF MAY 1-7			
Bonds			
Wisconsin Electric Power—1st mtg 1982	$12,500	....	....
Texas Electric Service—1st mtg 1982	8,000	....	....
Texas Electric Service—debentures 1977	5,000	....	....
Common Stock			
South Carolina Electric & Gas—417,719 sh (being offered to commonholders on 1-for-5 basis, record April 15 to expire May 1)	$4,021	99.625	6.23%
New England Electric System—920,573 sh (to be offered to commonholders on 1-for-8 basis, record May 8 to expire May 26)	.....	.....	.....
SCHEDULED FOR MAY			
Bonds			**Bid Date**
Worcester County Electric—1st mtg 1982	$4,000	.....	May 13
Iowa Power & Light—1st mtg 1982	10,000	.....	May 21
Central Vermont Public Service—1st mtg 1982	1,500	.....	.....
Preferred Stock			
Dallas Power & Light—100,000 sh no par cum	.....	.....	May 26
Long Island Lighting—100,000 sh $100 par	$10,000	.....	.....
Common Stock			
New York State Electric & Gas—300,000 sh	.....	.....	(b) May 14
Iowa Power & Light—226,928 sh (to be offered to commonholders on 1-for-7 basis, record May 14 to expire May 28)	.....	.....	.....
Wisconsin Electric Power—702,486 sh (to be offered to commonholders on 1-for-5 basis)	.....	.....	.....
Central Vermont Public Service—108,900 sh (to be offered to common holders on 1-for-6 basis; New England Public Service, owner of 35.5% of common to waive its subscription rights; competitive bids will be asked)	.....	.....	.....

Notes—(a) Stockholders are allowed oversubscription privileges, and (b) First Boston Corp, underwriter.

CALENDAR

Electrochemical Society
50th Anniversary Meeting, Benjamin Franklin Hotel, Philadelphia, Pa., May 4-8.

Edison Electric Institute
Electrical Equipment-Prime Movers Committees, Edgewater Beach Hotel, Chicago, May 5-6; Association of Edison Illuminating Companies, Meter-Service Committees, Edgewater Beach Hotel, Chicago, May 5-7; Transmission-Distribution Committee, Edgewater Beach Hotel, Chicago, May 6-7; Hydraulic Power Committee, Edgewater Beach Hotel, Chicago, May 6-7; Purchasing-Stores Committee, Roosevelt Hotel, New Orleans, La., May 11-14; Accident Prevention Committee, Indianapolis Athletic Club, Indianapolis, Ind., May 22-23; 20th Annual Convention, Cleveland Public Auditorium, Cleveland, Ohio, June 2-4.

Illuminating Engineering Society
Great Lakes Regional Conference, Hotel Statler, Cleveland, Ohio, May 5-6; East Central Regional Conference, Webster Hall Hotel, Pittsburgh, Pa., May 21-23; Northeastern Regional Conference, Hotel Preston, Swampscott, Mass., June 19-20.

National Electrical Manufacturers Association
4th International Lighting Exposition-Conference, Industrial-Commercial Lighting Equipment Section, Cleveland Public Auditorium, Cleveland, Ohio, May 6-9.

Northwest Electric Light & Power Association
Engineering-Operation Section, Rainbow Hotel, Great Falls, Mont., May 7-9; Business Development Section, Chinook Hotel, Yakima, Wash., May 12-14; Personnel Section, Vancouver Hotel, Vancouver, B. C., May 19-21; Accounting-Business Practice Section, Medford Hotel, Medford, Ore., May 22-23.

Pennsylvania Electric Association
Spring Meeting, Relay Committee, Lawrence Hotel, Erie, Pa., May 8-9; Electrical Equipment Committee, Hotel Roosevelt, Pittsburgh, Pa., May 15-16; Spring Meeting, Systems Operation Committee, Allenberry Lodge, Boiling Springs, Pa., May 22-23; Spring Meeting, Transmission-Distribution Committee, Irem Temple Country Club, Dallas, Pa., May 22-23; Spring Meeting, Prime Movers Committee, Tidewater Inn, Easton, Md., May 28-29.

Public Utilities Advertising Association
Annual Convention, Hotel Radisson, Minneapolis, Minn., May 8-9.

Interstate Power Club
Hotel Martinique, New York, May 12.

Nashville Electric Service
1952 Electric Show, Electric Center Bldg., Nashville, Tenn., May 12-17; co-sponsored by Nashville Electrical Dealers Association.

New Jersey Utilities Association
Spring Conference, Seaview Country Club, Absecon, N. J., May 16.

C.I.G.R.E.
(International Conference on Large Electric High-Tension Systems), 14th Biennial Session, Paris, France, May 28-June 7.

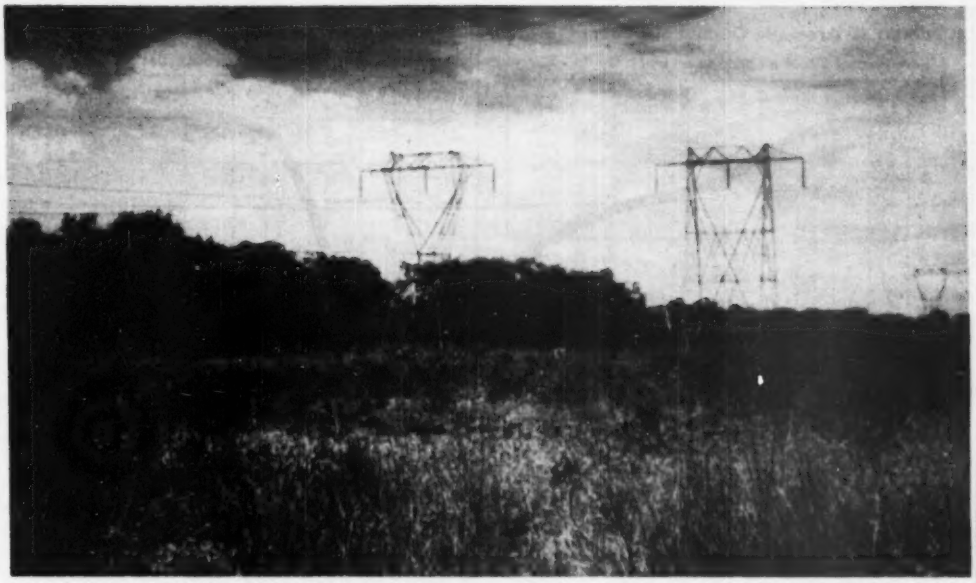
***National Association of Electrical Distributors**
44th Annual Convention, Hotels Ambassador-Chelsea, Atlantic City, N. J., June 9-12.

International Organization of Standardization
Triennial Meeting, Columbia University, New York, June 9-21.

***Pacific Coast Electrical Association**
Annual Convention, Hotel del Coronado, Coronado, Calif., June 11-13.

***Canadian Electrical Association**
Annual Convention, Banff Springs Hotel, Banff, Alba., June 30-July 2.

* Addition this week.



EFFECTIVENESS OF DORMANT SEASON SPRAY is shown by the high density of dead stems on this right-of-way. One dormant season of 2, 4, 5-T in oil spray application produced this satisfactory maintenance condition. Excellent kill was had on 15-ft woody plants

Dormant Season Brush Control Is Easier and More Effective

Tests of basal-bark sprays by Ontario Hydro proved three advantages of method in that region. Care must be taken in selecting the proper chemical

J. W. SUGGITT, Research Chemist, Research Division,
Hydro-Electric Power Commission of Ontario

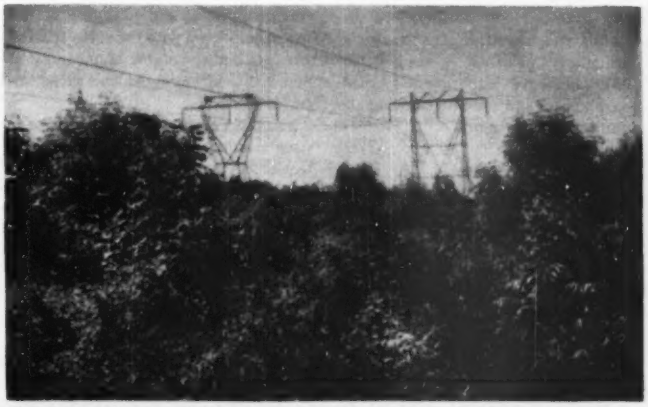
Dormant season brush treatment with herbicidal chemicals is more effective than foliage treatment. Tests by the Hydro-Electric Power Commission of Ontario proved these three advantages:

1. Greater ease in traversing rights-of-way during the leafless winter season.

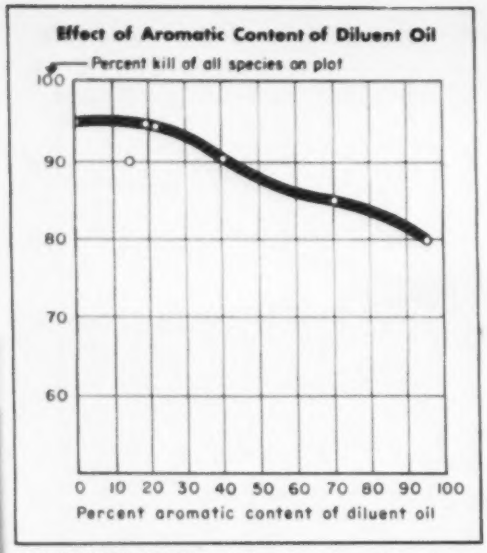
2. Decreased species selectivity of certain herbicides.

3. Opportunity to develop a spray program that provides work for trained crews over a larger part of the year.

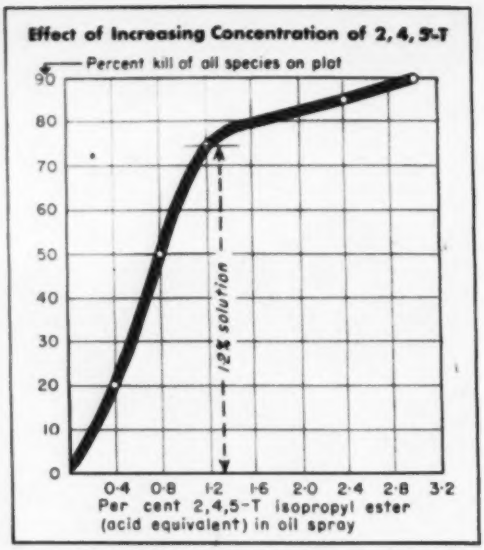
Basic Experimentation . . . During the winter of 1949-1950, preliminary experiments were carried out on the use of herbicides as dormant season,



UNTREATED RIGHT-OF-WAY shows the effects of three years of growth. It was cleared three years ago but since then has been left unbrushed. High brush makes traveling difficult


Effect of Aromatic Content of Diluent Oil
Percent kill of all species on plot
100
90
80
70
60
0 10 20 30 40 50 60 70 80 90 100
Percent aromatic content of diluent oil

HIGH AROMATIC CONTENT of oil carrier used as a diluent for concentrated herbicides lowered kill. Herbicide strength was constant



HIGHER CONCENTRATIONS OF 2, 4, 5-T will give better results, but increased cost of spray is out of line for results obtained

Canadian tests favor basal-bark spray for brush control

basal-bark sprays for the control of woody growth. This work, when reviewed during the summer of 1950, proved to be most encouraging in giving control over certain species which were resistant to summer-foliage sprays.

Other advantages were the ease of treatment and the excellent kill obtained on specimen woody plants, which ranged up to 12 to 15 ft in height. The good control obtained over maple, hawthorn, hickory, and oak, in addition to all the more susceptible species, made this treatment particularly valuable. During 1950-1951, intensive experimental work was planned and executed during the dormant growth season.

Materials and Methods . . . From October 1950 to May 1951, 35 experimental plots, each one-twentieth acre, were treated with various herbicides and herbicide concentrations. Applications of chemical solutions were made on the fifteenth of each month between October and May excluding December. A survey was made of the dominant and co-dominant species on each plot. Of the 15 species common to most plots, 11 would be classified as resistant if the herbicides were applied as foliage sprays.

For the dormant-season, basal-bark spray treatment, the oil-herbicide solution was applied by knapsack sprayer to the bark at the base of the plant and to the trunk and lower branches to a height of 3 to 3½ ft. A relatively large volume of spray solution (60 to 75 gal) was applied per acre of brush (of normal growth density). Earlier work had shown that low-volume applications of concentrated herbicide did not give consistent results even with the same species, whereas higher-volume applications at nominal acid strengths had given superior kills.

During February 1951 further tests were conducted to determine the effect of the aromatic content of the oil carrier used as a diluent for the concentrated herbicides. A series of five different oils of varying aromatic content was used in the experimental application. By holding the herbicide strength at 16,000 ppm (parts per million) of 2,4,5-T the effect of varying the aromatic content of the diluent oil was studied.

The use of high-volume oil sprays of 2,4,5-T gave consistently better control than low-volume applications. When 60 to 75 gal of oil-herbicide were applied per acre, the resultant control obtained was 10 to 25% greater than when the same amount of 2,4,5-T acid was applied in oil at rates of 10 to 20 gal per acre. Hence high-volume sprays with thorough stem wetting give superior results.

A considerable difference was observed between the results of applying the esters of the 2,4-D and 2,4,5-T combination, and 2,4,5-T ester alone. The application of 2,4,5-T ester in oil gave the best results.

The use of water in place of fuel oil as a diluent would, of course, reduce the cost of the spray considerably. However, water as a carrier in dormant-season basal spraying gives much less satisfactory results than oil.

The aromatic content of the oil carrier has some bearing on the resultant effective kill. Oils with a 0 to 30% content of aromatic fractions are more effective than oils with higher aromatic oil contents. Used transformer oil (18% aromatic), diesel oil, stove oil, and No. 2 fuel oil are all satisfactory for use as diluent oils.

A concentration of between 1.2% and 1.5% of 2,4,5-T acid (12,000-15,000 ppm) in oil appears to be the most potent and economical spray

solution to use in dormant basal-bark spray operations. The use of higher concentrations of 2,4,5-T will give better results, but the increase in cost of the spray is out of line when compared with the slight increase in resultant effectiveness.

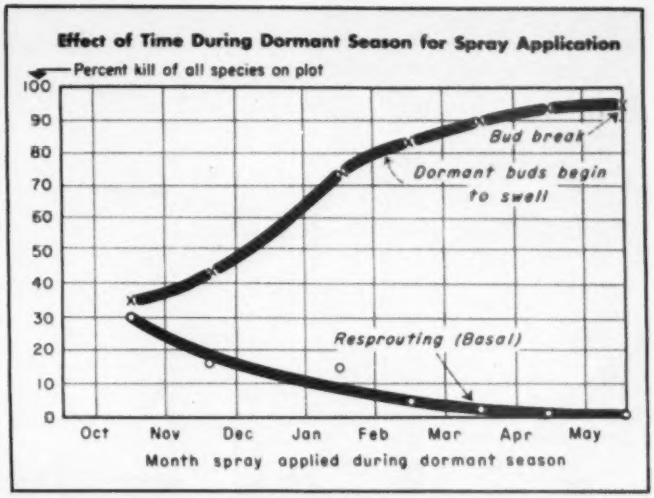
Time of Application . . . Early dormant-season applications of 2,4,5-T oil as a basal-bark spray, (from late fall until January) give poor and unreliable kills with considerable basal resprouting. Applications from February until May give an excellent kill of all species. The nearer to budbreak the herbicide is applied the better the results. For best results, dormant sprays should be delayed until bud-swelling is noticed during early February.

Where snow lay on the ground at the time of spraying, burying smaller stems and roots, or where "misses" occurred, there was regrowth on all species of stems equivalent to that present on control plots. Some sumac and poplar sprouted from lateral roots of the parent plant with no strong evidence of lateral translocation of herbicide, at least within the first growth season after treatment. Only downward translocation of the herbicide could be observed.

Dormant basal-spray applications are most valuable on maple, where growth is rendered weak and depressed. A few red maple stems (less than 25% of all the maple stems on any one plot) had sent up a few feeble new shoots. Data from the 1949-1950 dormant spray work show that these may die the following winter.

Root kill was observed or is probable for all species which show dead cambium on all stems to ground level and which did not resprout during the active summer growth season. All susceptible brush species were easily controlled, and only basswood and maple of the resistant species normally encountered showed any regrowth from the main stem.

TRACTOR DRAWN Buffalo turbine mist blower spraying oil and 2,4,5-T on sumac



TIME OF SPRAYING plays an important part in this method. Oil spraying from February to May gives excellent kill. Best results can be had if spraying is delayed until bud-swelling

Excellent top kill was obtained at 16,000 ppm of 2,4,5-T in oil with every species except basswood, but basal resprouting occurred with early winter spray applications on basswood, maple (hard), ash (white), and hickory. The one species offering strong resistance to dormant basal spraying is basswood, and this species is controlled only with liberal high-strength (24,000 ppm) applications of 2,4,5-T ester in oil.

Properties of Oil . . . The physical characteristics of the oil used as a diluent must be carefully evaluated. Certain specifications, aside from the aromatic oil content, must be imposed. The diluent oil must not be corrosive to spray equipment or have an objectionable odor. It must be compatible with the concentrated herbicide and must mix in all proportions.

Freezing temperatures must not cause coagulation or gelation of the oil, otherwise spraying in cold weather would be untenable. The viscosity of the oil at all temperatures must be such that an easy flow from standard nozzles is obtained. Finally, the flash point of the diluent oil must be sufficiently high so that no flash-fire hazard will exist during spraying operations.

As a result of this research work and from observations made with full-scale dormant-brush treatment, an expanded program of basal-bark spraying during the winter season has been in operation during 1952 and this will yield further results.

Conclusions . . . Although this experimental work was primarily concerned with dormant season treatment of brush, basal bark applications are also effective during the summer growth season. Application techniques, herbicide concentration, and carriers are essentially the same as for dormant application. However, its practical use will probably be more restricted than dormant season treatments. Spray crews will experience difficulty in getting through heavily foliated brush and dense stands of weeds, which will increase the per acre spraying time and reduce the efficiency of stem spray coverage. This will result in an expensive operation which can normally be done cheaper by high-volume foliage sprays.

The major function of summer basal sprays would seem to be the spot-spraying of resistant species in areas which have already been opened up by previous high-volume foliage treatments.

POLE LINES are on rear boundaries of lots. Drops are run to supports on the houses to assure 15-ft clearance between cables and ground

13.2-Kv System Does the Job in Swiftly Growing Levittown

Long Island Lighting Co had to provide service for more than 31,000 new homes in four years. Now it's using the same basic distribution design for other housing projects

A. J. **PANSINI**, Manager, Meters & Distribution Engineering, Long Island Lighting Co, Mineola, N. Y.

Satisfactory performance of a 13.2-kv distribution system serving one of the nation's largest housing developments at Levittown, N. Y., has brought to light no major change or improvement in its operation which could be expected to improve its performance. Long Island Lighting Co is including the same basic operating principles in the design of 13.2-kv systems for other housing developments.

The Levittown area is served by 4 substations and 16 distribution circuits. Peak demand in 1951 was approximately 57,000 kva. In 1947 it was less than 7,500 kva.

In the spring of 1947 Levitt & Sons, Manhasset, L. I., informed Long Island Lighting Co that it planned to start construction of 1,883 houses in July and expected to have them occupied by the following January. Later plans called for the construction of approximately 4,500 homes in 1948, 5,600 in 1949, 4,800 in 1950, and 2,400 in 1951. Between July 1947 and November 1951 Levitt built some 20,000 houses. Other developers constructed an additional 11,500 houses in contiguous areas.

To meet this schedule from design and planning through construction required a high degree of coordination among the electric company, telephone company, the developer, and other affected groups. The developer made available to Long Island Lighting his plans for the complete development of his holdings. Excellent cooperation by all parties avoided duplication of effort and expedited work.

Load Conditions . . . The first group of houses, 4 rooms and expansion attic, each had a connected load of 2 lighting circuits, a 9.5-kw range, a refrigerator, an oil burner, and an automatic washer, all installed by the builder. In addition, there were the usual appliances to be added by the householder when he moved in.

Because the development was new and appliance saturations were known, there was an opportunity to obtain the utmost economy in distribution system design and operation.

Elaborate records were kept of demand. They showed average diversi-

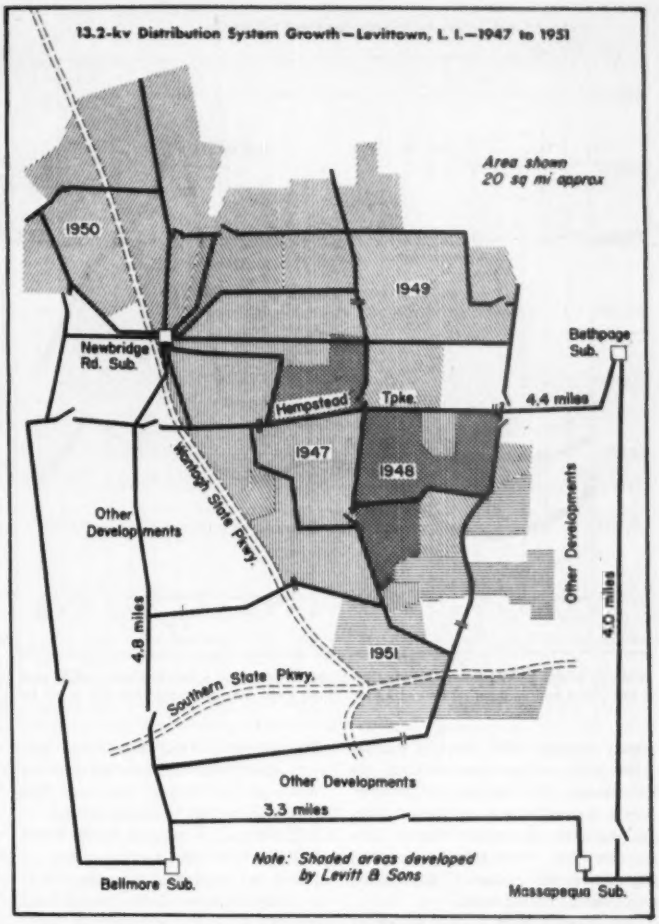
fied demand per customer in excess of any previously experienced on the system. Maximum diversified demand per house was 0.92 kw. In 1950 when the builder added a 12-in. television set (395 w), the demand rose to 1.2 kw. In the 1951 model houses a built-in, 1,350-w space heater replaced the television set, although practically all these homes have their own sets. Total connected load was raised to 14 kva. As a result diversified demands on this model are approximately 2 kw per house.

Load check for residences with television sets and attic room space heaters shows the 1951 peak demand to be 6.3 kw and average monthly consumption to be 235.5 kwhr in November and 282 kwhr in December (Christmas peak). For homes without attic room space heaters, corresponding figures are 4.9 kw, 171.8 and 214.2 kwhr.

Levittown gets its water from a number of deep wells. Pumps with 60-100-hp motors add approximately 2,500 hp to the distribution system loads in this area.

The school system consists of five grade schools with 83 rooms and a junior high with 24. Twenty grade school rooms and 27 junior high rooms are to be added. A proposed high school is to have 40 rooms. Demands average 75 kw for the present grade schools and 225 kw for the junior high school.

Other community loads and approximate values are: Street lighting, 400 kw; 12 shopping centers with banks and theatres, total 4,500 kw; 9 parks, 135 kw; 8 swimming pools, 680 kw.

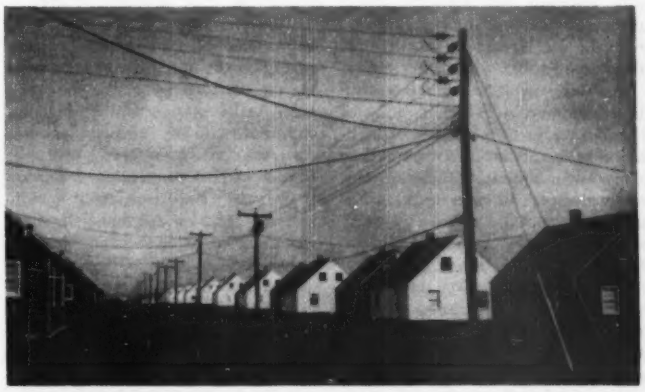


HOW LEVITTOWN GREW is shown by map. Shaded areas indicate where 1,883 houses were built in 1947, 4,500 in '48, 5,600 in '49, 4,800 in '50, 2,400 in '51; 11,500 in other projects

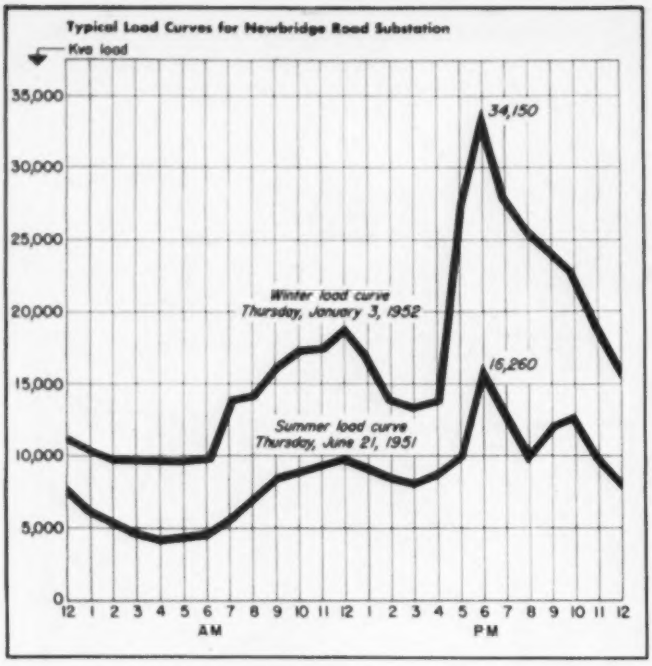
Primary Distribution . . . When the developer first made known his plans, the utility prepared its power supply for the area in two steps: (1) covered the first 1,883-home development and (2) covered possible expansion in 1948.

The first step in setting up a 13.2-kv distribution system called for the installation on a temporary basis of a 3,000-kva, 23-13.2-kv transformer and one 3-phase, 1/0 distribution feeder. It was assumed this set-up would provide for the planned development of Levittown and also supply spare capacity for conversion of existing 4- and 2.3-kv feeders in the area adjacent to the Newbridge Substation.

Then further Levittown develop-



A 90-DEGREE TURN on 13.2-kv, 3-phase primary distribution and single-phase, 3-wire secondary service lines appears like this. The joint-use poles also carry the telephone lines



SUMMER LOAD CURVE follows closely that of the winter. Here a typical summer daily peak is just about half as great as that in winter. Home peak demand ranges from 4.9 to 6.3 kw

ments through 1951 became known. This information coupled with the knowledge of other nearby developments necessitated a review of plans for the entire Levittown district. Immediate steps were taken to expand the system still further to handle the expected increased load.

As a result Step 2 was advanced and expanded to provide service for the contemplated loads. At the same time provision was made to supply additional capacity for conversion work in the vicinity of the development area.

As this would be highly concentrated within a 3- or 4-mile radius of the Newbridge Substation, the installation at this station was expanded to a maximum of four 5,000/6,250-kva, fan-cooled 66-13.2-kv transformer installations, and the temporary bank removed. Three additional 5,000/6,250, fan-cooled, 66-13.2-kv transformers were installed at three other substations, Bellmore, Bethpage, and Massapequa. A total of 16 13.2-kv, 3-phase, 1/0 distribution circuits, nominally rated at 4,500 kva per circuit, were erected.

Work started in the spring of 1948. The growth of the distribution system since then has been closely coordinated with that of the area. The three single unit substations are so designed that a second 5,000/6,250 kva, 66-132-kv unit can be readily installed and additional outgoing 13.2-kv circuits provided for future load growth.

Permissible loadings on the transformer units during winter peaks are based on ASA standard, C-57-32-1948. The loadings per unit have approached this value at times. Loads of 57,000 kva have been handled during the past two winters on the combined units at the four substations with no signs of excessive heating.

Fuse-Breaker Coordination . . . To insure safe and dependable operation this 13.2-kv distribution system was designed to operate on the "Selective Fuse-Breaker Method of Protection" which is basically as follows:

1. Feeder breaker relays are equipped with instantaneous release attachments which trip the circuits instantly under fault conditions.

2. Feeder breaker recloses immediately, and simultaneously the trip circuit is transferred to the time delay relays.

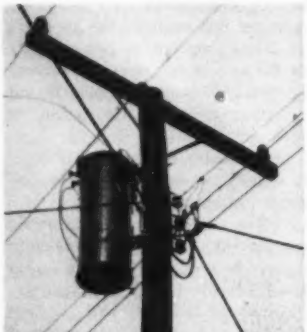
3. If the fault is a transient one, the fault current will, in most cases, have been cleared by the instantaneous trip; and service will be restored after the breaker recloses.

4. If the fault persists and happens to be on the load side of a sectionalizing fuse, the time required by the delay relay to operate the breakers will be more than sufficient to blow the sectionalizing fuse ahead of the fault. This will remove the faulted line from the circuit.

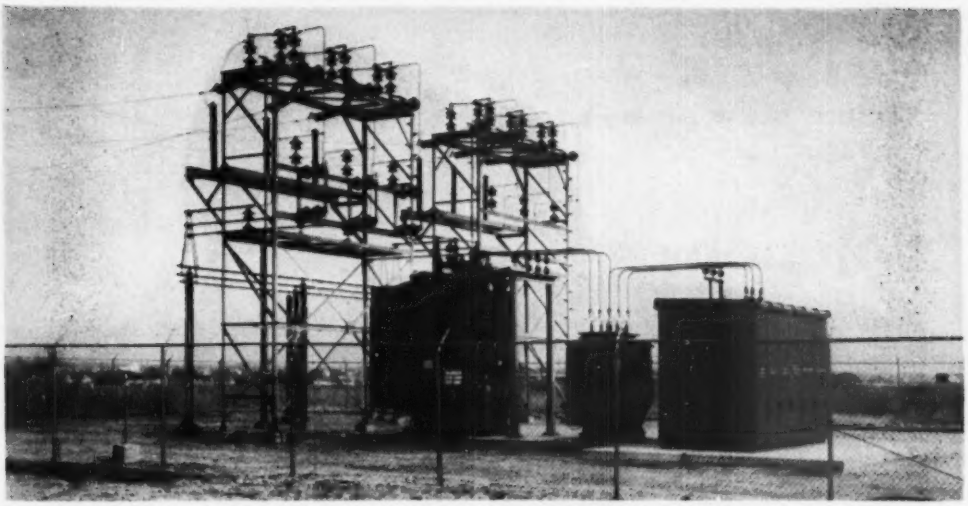
5. If the fault still exists when the breaker closes and does not clear through a sectionalizing fuse, the breaker goes through its complete time delay cycle, and the reclosing mechanism is locked out.

All 13.2-kv distribution circuits are protected through fuse-breaker coordination as described. The feeders have operated satisfactorily, with only a limited number of outages, since they were installed. In fact operating experience with them has been decidedly better than with the older 4-kv system. During the 1949 sleet storm and the 1950 wind storm no troubles were experienced on the 13.2-kv primary in the Levittown area. The only interruptions were caused by posts on houses breaking and faulting service cables.

This better operation was in part due to the greater line clearance and to the greater tree clearance. For the most part fast breaker operation coupled with proper fuse coordination, which limited fault duration and thus prevented excessive damage, con-



FOUR SERVICE DROPS per pole is average. This 25-kva transformer is tapped to the 13.2-kv primary and supplies 115/230 v to the service lines in vertical arrangement



UNIT SUBSTATIONS serving the Levittown of today can be expanded to serve that of tomorrow. Installation above is typical. It is rated 6,000/6,250 kva, fan cooled, 66-13.2 kv. A second transformer of same rating can be added. There will be room for more 13.2-kv circuits

tributed much to the better performance.

All branch taps off the feeder main are sectionalized also by properly coordinated fuses. These prevent local fault conditions from affecting the feeder mains.

Service Lines . . . Combination of a No. 2 copper secondary and a 25-kva transformer showed the least annual cost. However, No. 3 conductor is used because it is standard on the system, and the economy is only slightly overbalanced. In the Levittown layout there is an average of 20 services from each transformer. In a few cases a 15-kva transformer averaging 10 services was installed.

Distribution transformers are single-phase, 7,620/13,200-120/240 v completely self-protected type with a pilot light.

Secondary conductors are No. 3 with weatherproof braid, with bare common neutral in the secondary position usually of the same size.

Service drops are 3-wire, No. 6 concentric, usually four services per pole.

An agreement was made with the New York Telephone Co that all overhead construction would be rear-lot and for joint use. Easements were secured on this basis. Additional easements to bring out street lighting cable were secured along property lines. All street lighting is multiple circuit and feeds to lamps are brought out underground between houses.

All pole lines are on rear-lot property lines. Most poles are 30 ft; cross-over and junction poles are higher, usually 35 ft. No. 1/0 copper wire is used for primary distribution (13.2 kv) feeder mains and for the common neutral where primary mains exist.

Sectionalizing fuses are installed in indicating-type cutouts to protect main primary circuits. Air break and disconnecting switches are installed at strategic points to sectionalize circuits during emergencies or under unusual operating conditions.

Line Construction . . . Many steps were taken to cut labor costs and to avoid hot-stick work during the construction period.

Installation of primary and secondary mains and services, street lighting feeders and controls, and transformers was completed first and energized only as the last step in the construction program. Where future extensions were indicated, primary (13.2 kv) circuits were terminated on junction poles, vertical turns, or one section beyond disconnects, air-break switches, or fuse points in main lines. This minimized the amount of hot-stick work. In a few cases, later single-phase extensions were connected by hot-line taps.

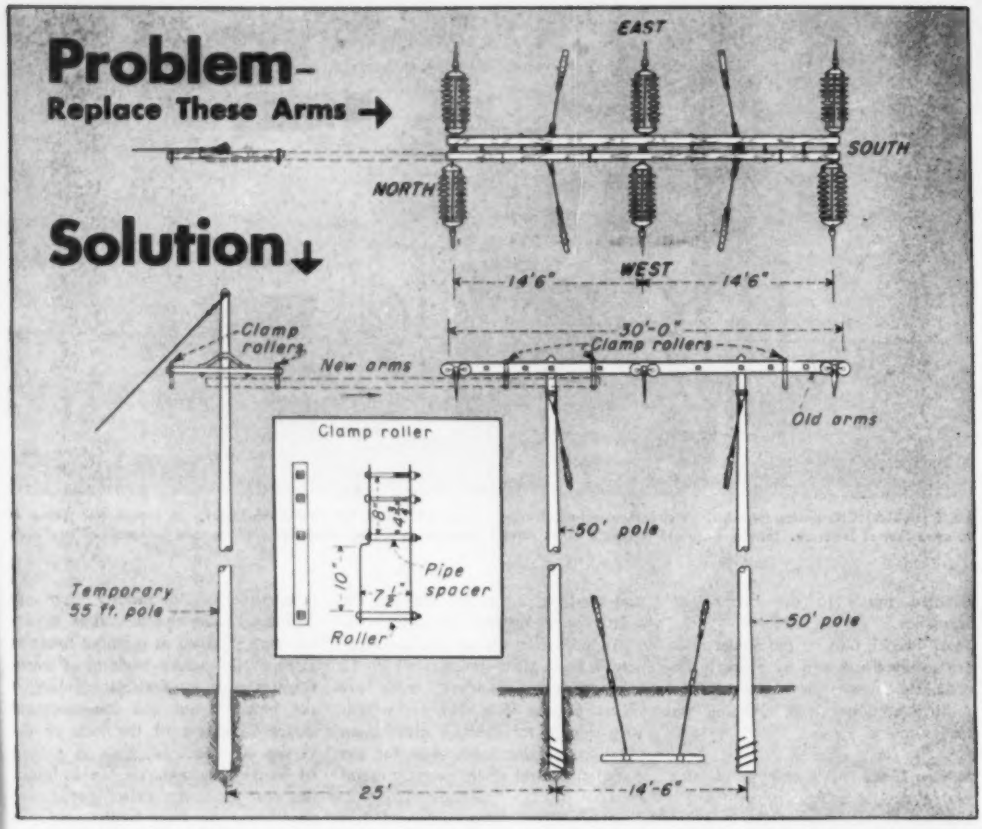
In most cases, secondaries were constructed continuously initially within a block, and secondary breakers were installed as required between circuits. Secondary banking of transformers was not feasible because of the block layout and the electrical design. Because of the lack of diversity of this load, little is gained by banking secondaries. In addition, the cost to make these secondaries continuous between blocks and the unsightly results far outweigh any possible advantage.

Pole and anchor holes were generally dug by machine. Soil conditions were such that four-wheel-drive equipment often was necessary.

Outdoor metering is used throughout the development.

Average cost per customer was approximately $80. This included services, meters, and transformers but excluded substations.

Line Crews . . . Because all large developments were built in sections and lines were de-energized, apprentice crews were assigned the preliminary work. Apprentice line crews usually consisted of an experienced foreman and ten apprentice linemen. They dug holes, set poles, installed crossarms and hardware, ran copper wire, hung transformers, installed cutouts and lightning arresters, ran service drops, and installed meters. This arrangement saved the regular line crews for jobs requiring experience.



110-KV H-FRAME STRUCTURE showing layout of equipment for replacing rotten double arms while line was energized. This method eliminates a 5-hour outage required by former method with line de-energized. Conductors are 397,500 CM ACSR, sagged to 3,700 lb tension, and dead-ended to ¾-in. by 24-in. spacer eye bolt with double yoke assembly. Job was outlined completely in advance

110-kv Hot Line Arm Replacement Eliminates 5-Hour Outage

ROY T. ANDERSON, Live Line Consultant
Carolina Power & Light Co, Raleigh, N. C.

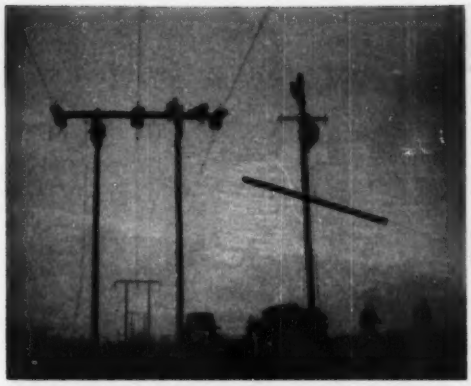
Use of hot line techniques for replacing rotten double arms eliminated a 5-hour outage on a 110-kv line which normally carries a 70,000-hp load. It is extremely difficult to schedule an interruption on this circuit. The job was completed by eight men working 12 hours. Formerly it required 5 hours for the same number of men to do this work with the line de-energized.

By outlining every step of the job in writing in advance and discussing every detail with the men, the working time was shortened considerably. All planning and supervision was done by the author.

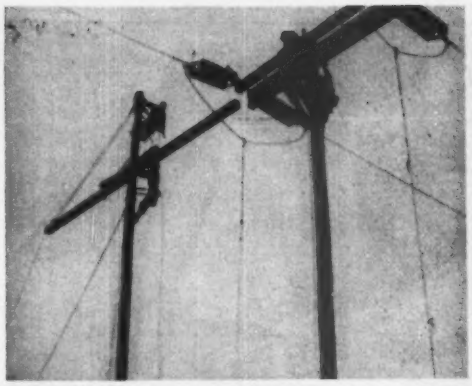
Preliminary Steps . . . A 55-ft pole was set 25 ft from the pole on north end of the H-frame structure and guyed on its north side. This pole was 5 ft higher than the adjacent H-frame. A 3¼-in. x 4¾-in. x 9-ft arm was placed on the temporary pole level with arms on H-frame. Two clamps with rollers on the bottom were placed on this arm.

With a winch cable passed through snatch blocks at the top and bottom of the temporary pole, the two new 6-in. x 8-in. x 30-ft arms were raised one at a time and secured in clamps on the 9-ft arm of the temporary pole. Next, the north jumper on the H-frame structure was pulled in so that it cleared the new arm by 5 ft. Three clamps with rollers were next placed on the old H-frame.

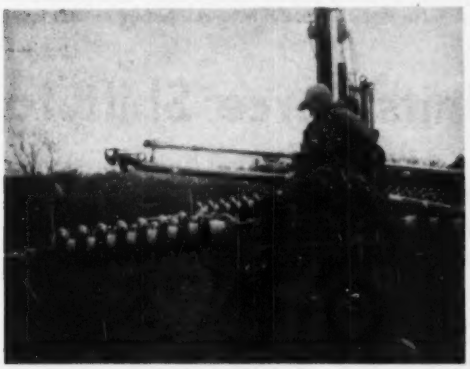
From on top the temporary pole, a pair of rope blocks was then placed on each end of the one new arm to



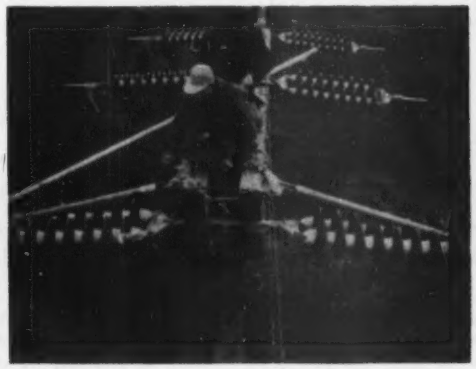
TEMPORARY POLE 5 ft higher than H-frame structure has arm with two clamp rollers. New arm is raised with truck and winch cable



NEW ARM in clamp rollers on temporary pole ready for rolling into position under old arm. Note link stick and rope in loop assembly



STRAIN LINK STICK is put on. Note end of link stick on opposite side. Rope slings with chain hoist hold weight of dead end assemblies



DEAD-END ASSEMBLIES are transferred from the top (old) arms to the new arms. Note that the strain link sticks are still on

allow it to be rolled south and at the same time be under complete control. After rolling this arm south 5 ft, blocks were slipped back an equal distance. A chain hoist in the side guy of the temporary pole kept it from leaning toward the H-frame and allowed the new arm to go into rollers clamped to old arm.

After the south end of the new arm was in roller clamps on north side of H-frame, blocks were removed from the temporary pole and the new arm, and a ½-in. line was placed on each end of it, one for pulling and one for holding back. This way the arm was rolled into place and bolted.

The three roller clamps were then clamped on the second new arm, and it was rolled into place. Three ½-in. x 3-in. x 28-in. plates were put on top of the second arm as it was rolled in. Plates were used instead of eye bolts to secure dead-end assemblies to arms.

Transfer Operations . . . To transfer the dead-end assemblies from old arms to double arm plate on new arms the following tools were used:

Two special strain link sticks (38 in. wood)

One specially made double dead-end plate, holes spaced 18 in. and back casting of single strain set

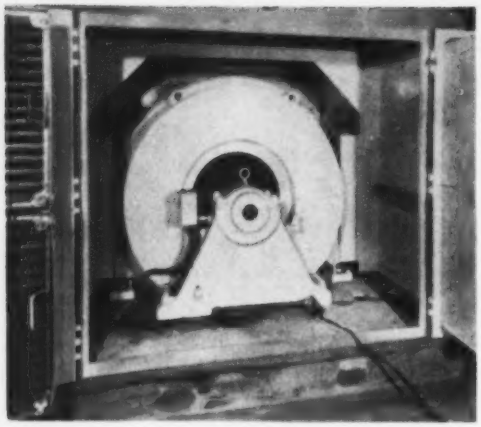
Four ⅝-in. x 2½-in. straight clevises

Two ¾-in. x 24-in. eye spacer bolts

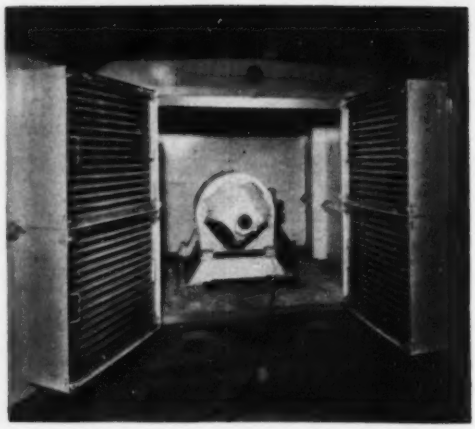
Prong of the special strain link stick was placed over dead-end plates using one pole saddle with 2-in. pole clamp on the old arm 3 ft from dead-end assembly; in this was one 2-in. x 10-ft wire tong that clamped to prong end of strain link stick, since it was heavy, to help in hooking it on dead-end plate. After the two sticks were on, conductors were picked up until both strings of insulators were slack. This was done by turning nuts on eye bolts 18 in. This removed strain from both dead-end assemblies.

A ¾-in. rope sling was tied back of first unit from arm on both sides. A ¼-ton chain hoist was used in this sling across top of the old arms to pick up slack in insulator strings so as to transfer double dead-end assemblies from eye spacer bolts to plates on new arms. Strain was next transferred from link sticks to insulator strings by turning nuts to off position on ¾-in. eye bolts while at the same time slacking chain hoist.

To remove strain link sticks the same method was used as when link sticks were installed. Link stick was lifted off and swung back to the arm, the third phase having been transferred from old to new arms. Old arms were cut into four pieces and let to ground by rope and blocks, leaving new arms mounted 8 in. lower on poles than old arms.



ROTOROL ON UNIT NO 1 of main exciter motor-generator set can be seen through the open end of the unit when doors are opened



DRIVING MOTOR on Unit No 1 of main exciter motor-generator set is rated at 450 hp and 2300 v. Induction motors are preferred for set

Large Generator Units Force Shift to

Direct-connected exciters are not practicable for units of 80,000 kw and larger because of long shaft required. Here is solution used at Duquesne Light Co's new Elrama Station

G. B. MILLER, JR., Duquesne Light Co*, Pittsburgh, Pa.

Direct-connected exciters are no longer feasible on generating units of 80 Mw or larger. The combination shaft required for units of this size is too long to be practicable in many stations. Duquesne Light Co's solution to this problem is to use a fly-wheel type, motor-driven exciter.

Duquesne's new Elrama Station has two units rated at 80,000 kw, 3,600 rpm, and 13.8 kv. The main unit is to be excited by a separately driven, fly-wheel type, motor-generator set fed from the 2.3-kv station service buses. The station service generators, however, will use direct-connected exciters as they are rated at only 9,375 kva.

Exciter Requirements . . . The exciter MG set must be designed to provide excitation equivalent to that of a direct-connected exciter during all system disturbances which do not cause instability. It should meet the following general requirements:

1. Induction motors should be used in preference to synchronous, which are more affected by system faults.

2. The exciter MG set should be capable of delivering maximum forcing excitation to the generator field when the motor voltage is 70% of normal for one-half second. To meet these conditions, exciter MG sets have become fairly well standardized as follows:

- **a** Inertia constant of the MG set equal to 5.0
- **b** Pull-out torque of the driving motor equal to 500%
- **c** Response ratio of main exciter when operating at minimum speed, equal to 0.5
- **d** Ceiling voltage when operating at minimum speed, equal to 120%

3. Transfer characteristics of MG set should prevent needless transfers for short system disturbances. However, if the voltage should remain below 70% for too long a time, an automatic transfer to auxiliary power should be made. This will prevent loss of excitation.

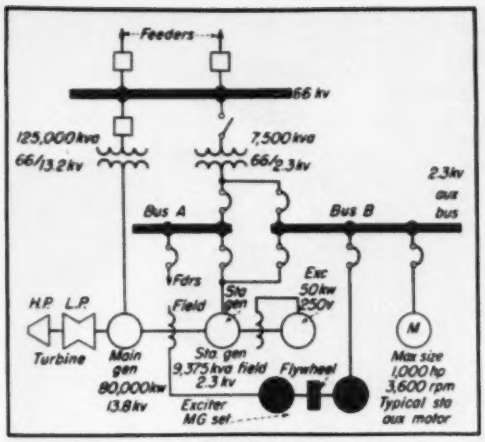
Elrama Station meets the requirements of having two auxiliary power sources. Preferred source is the direct-connected station generator. Standby source is a step-down transformer connected to the 69-kv system. Auxiliaries are divided between two 2.3-kv buses. One bus operates from the station generator, and the other from the system transformer.

Exciter Transfer Problems . . . Initial investigations of the exciter characteristics indicated that a transfer should take place upon loss of voltage for 30 cycles or longer. Undervoltage relays used in the past for other transfer schemes were usually set at one-half time lever. This produced a time delay of about 30 cycles for voltages 0 to 20% of normal. The 30-cycle transfer time influenced the requirements of the MG set. The MG set actually purchased had the following characteristics:

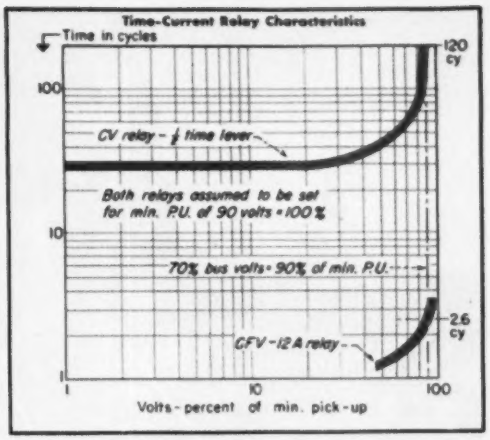
1. Inertia constant . . . 10.0
2. Pullout torque . . . 550%
3. Response at minimum speed 0.5
4. Capable of delivering 120% voltage at 90% speed

Maintaining Power to Auxiliaries . . . The problem of maintaining power to other main station auxiliaries parallels the exciter problem. This is particularly true when large motors are involved in the transfer.

* Author is now associated with Ebasco International Corp, New York, N. Y. Article is based on material presented before the Pennsylvania Electric Association's Relay Committee.



ELECTRIC CIRCUIT ARRANGEMENT of the Elrama Power Station of Duquesne Light Co depicts new station feature—a fly-wheel exciter



RELAY CHARACTERISTICS STUDY showed that in no event should relay and transfer time plus trip and closing time exceed 50 cycles

Motor-Driven Flywheel Exciters

A few cycles after transfer occurs, the impact of the load causes the generator voltage to drop to 60 or 65% before the voltage regulator takes effect. This dictates the use of station motors that can pull into step at or below 70% voltage. Rarely has it been found necessary to exceed this 70% figure. This voltage drop can sometimes be tolerated because as the smaller motors pull into step, generator kva is released to pull up these border-line motors.

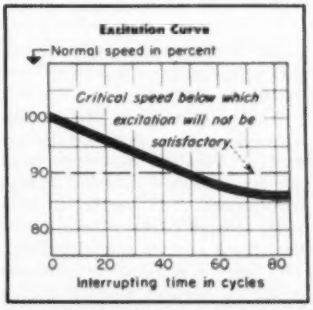
Transfer Time Limit . . . An important point in transfer of station auxiliary motors is the maximum outage time of important motors before a plant shutdown is necessary. Tests show that ignition is maintained in powdered fuel plants for as long as 5 to 6 seconds after loss of power. After this time the pulverizer exhauster slows down sufficiently so that the pressure-responsive safety devices operate to close emergency dampers and shut down the boiler. This would result in station shutdown.

Since 5 to 6 seconds is the outside limit, a transfer scheme should operate within less time. Any transfer requiring more than one second will cause some reduction in station output; therefore it becomes advisable to limit transfer time to about one second.

Review of Relay . . . The exciter and station auxiliary transfer characteristics were based on a maximum transfer time of 50 cycles. After the MG set was purchased, however, the undervoltage relay transfer characteristics were revised to see if the relay would meet the necessary transfer requirements.

This study developed that upon loss of supply and with no short circuit condition, the large station auxiliary motors become induction generators and hold the bus voltage above 70% for approximately 13 cycles. The voltage doesn't decay to zero until 60 cycles have elapsed.

On the theory that a system disturbance may occur and reduce bus voltage to zero, and with the relay set to pick up at 90 (78% of normal 115 v) the relay operating time would be 120 cycles. This time delay would be intolerable as excitation would be lost in this time.



SATISFACTORY EXCITATION will be had for about 50 cycles after loss of power to motor

New Relay Selected . . . This prompted a search for a relay that would effect a transfer within the allowable time. An undervoltage and phase sequence relay that operates on positive phase sequence, the same voltage driving motors, was selected. This relay picks up at 2.6 cycles or 117 cycles less than the previous relay, same conditions prevailing.

The plans called for using this relay with a dc timer. It was set to cause transfer at a definite time somewhat in excess of the time required to clear faults on 69-kv systems. The final time setting will be based on oscillographic transfer tests when the station is ready to be put into operation on the system.

Conclusions . . . It is imperative when considering a fly-wheel exciter, MG set installation, that the transfer characteristics be closely examined. In addition, an analysis of the transfer time should be made so that it isn't long enough to allow a critical station auxiliary to shut down the station or curtail output.

TEST DESK is a two-position design. Dial faces of the four standards are arranged in two pairs, each viewed in a mirror in an illuminated compartment in front of the operator

WILLIAM E. CHESHIRE, Engineering Division
RICHARD W. RADLER, Laboratory
Electric Meter Department, Cincinnati Gas & Electric Co

Equipment Designed for

"Pushbutton" Meter Testing

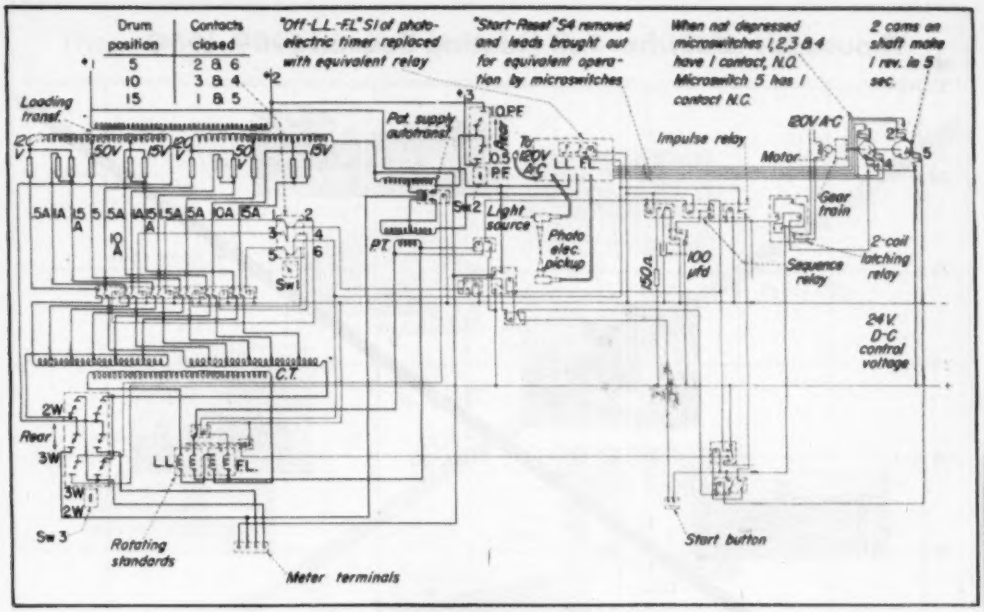
Greater efficiency, speed, and accuracy obtained from two-position automatic desk that requires less skilled tester. About one minute required for 5, 10, or 15-amp meter testing

Simplicity, fool-proof operation, speed, operator comfort, and neat appearance are confined in an automatic test desk that has been developed by the electric meter department of the Cincinnati Gas & Electric Co. The operator has merely to plug in a meter and push a button to obtain the test of a watthour meter at full and light load at unity power factor. If a 0.5 pf run is desired, it is obtained by flipping a lever and pushing the button. Meters of 5-, 10-, or 15-amp, 120- or 240-v, 2- or 3-wire, can be tested in little over a minute actual time depending upon how many revolutions are selected.

This test desk uses the rotating-standard watthour-meter comparison method. Standard and meter under test are connected in series through transformers. Test interval is accurately blocked off by a timer that is started and stopped photoelectrically. This timer is actuated by phototube pickup of impulses received from a light beam passing through the anti-creep holes of the meter disk.

Designed For Efficiency . . . The test desk is a two-position design, employing a uniload system, photoelectric timer, and four rotating standards. Two standards for each position enable the operator to have the latest full- and light-load errors before him in one position while the meter in the other position is running.

Because of the multi-ratio current and potential transformers of the uniload system, the standards always operate at full-load speed. Therefore, they can be read directly in 0.1% divisions when the photoelectric timer is set to make 10 revolutions of the meter at full load and one revolution of the meter at light load, for 10 revolutions of the standards at both loads. As each standard is set to zero error



TEST DESK CIRCUIT was a development of the engineering division of the company's meter department. Construction was carried out in the laboratory. Because multi-ratio current and potential transformers are used in the unload system employed, the rotating standards always operate at full-load speed. Test interval timer is started and stopped automatically by phototube pickup of light through meter disk

in the desk, no correction is applied. This feature avoids reading errors, increases speed, and reduces the knowledge required by the operator.

The standards are viewed directly in front of the operator at a comfortable viewing angle and correct reading distance. Dial faces of the four standards are arranged in two pairs, with each pair viewed in a mirror in an illuminated compartment. A pilot light in each compartment indicates the pair of standards and the meter position selected. Fluorescent lighting, with 8-in. tubes within the compartments, provides soft, shadowless light without glare.

Pushbutton Operation . . . The controls on the front panel are simple. They are as follows:

Kind of Switch	Switch Selection
Cam-operated drum	Position 1 or 2
Cam-operated drum	Meter 5, 10, or 15 amp
Lever-operated	Meter 2-wire 120-v, current off, or 3-wire 240-v
Lever-operated	Power factor 0.5, potential off, or power factor 1.0
Push button	Start of test

A circuit breaker, pilot light, and duplex convenience outlet complete the panel layout.

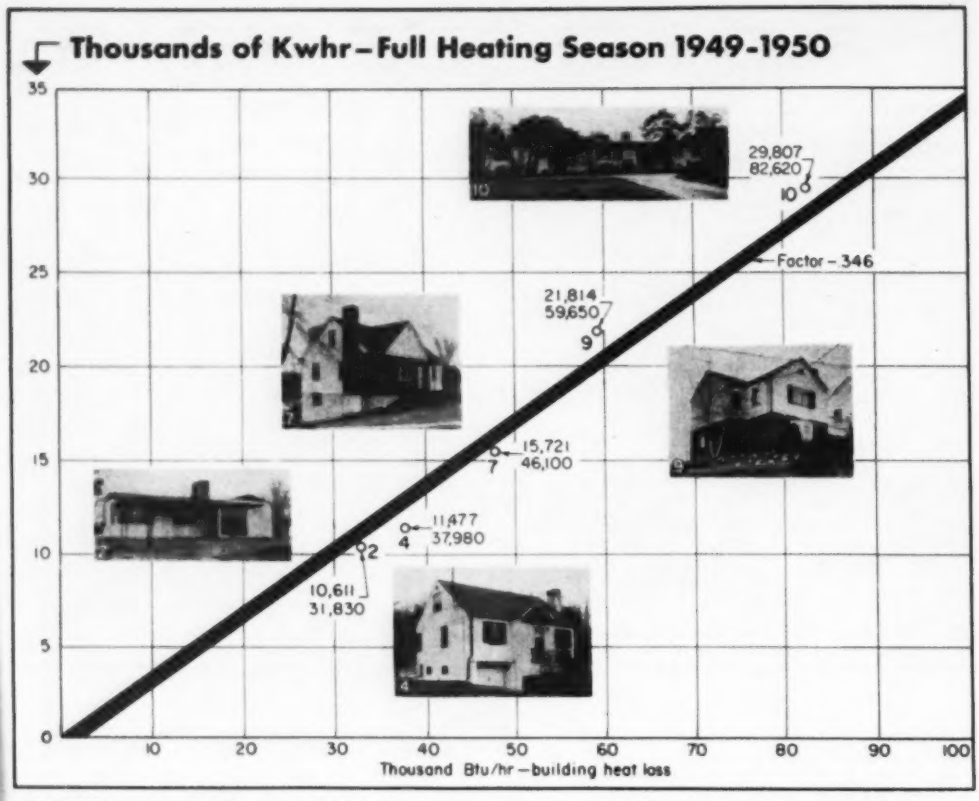
How It Works . . . After selection of settings of the switches to correspond to the rating of meter to be tested, a push of the button carries the sequence of operations through full load and light load automatically. The push of the start button initiates the action of a system of relays to perform automatically the following functions:

1. Disconnect the start button for the duration of the test so that subsequent pushing of the button will not interfere.
2. Start the meter on full load.
3. Reset the two standards (one for full load and one for light load) for the position corresponding to the position selected.
4. Reset and start the photoelectric timer which, in turn, starts and stops the full-load standard.
5. Change the load from full to light load.
6. Change connection from the full-load to the light-load standard.
7. Reset and start the photoelectric timer a second time which, in turn, starts and stops the light-load standard.
8. Shut down the test desk.

The error indications remain on the full- and light-load standards, undisturbed, while the operator selects the other position and presses the start button. The operator can then adjust the meter on which test has just been completed while the errors are before him on the standards, all during the time the meter in the other position is undergoing test. On again selecting the original position and pressing the start button, the error indications are removed by reset of the standards. Thus, the operator can devote most of his time to filling out cards, tags, and records, to adjusting meters and testing for creep, to checking gear mesh and register dials, and to sealing meters.

As a safety precaution, when the meter is not in place the meter voltage is turned off by automatic switching with microswitches which are operated by the placement of the meter in position.

The circuit, aside from the loading system and the photoelectric timer, was developed in the engineering division of the meter department, and the construction was carried out in the laboratory.



FIELD TEST in 1949-1950 heating season included these five houses. Energy use averaged 0.346 kwhr per Btu per hour heat loss

Consolidated Edison Checks Up on

Field tests show that cost of electric heating is directly related to degree of insulation against heat loss

In places where winters are relatively severe and where average electric rates prevail, the growth of electric house heating would seem now to be limited. But with improvement of heat insulation methods and practices, and for houses of very moderate size, it is conceivable that this load will reach significant proportions even in a relatively cold climate.

An apparently consistent relationship exists between the heat loss of a house and the electricity required to heat it.

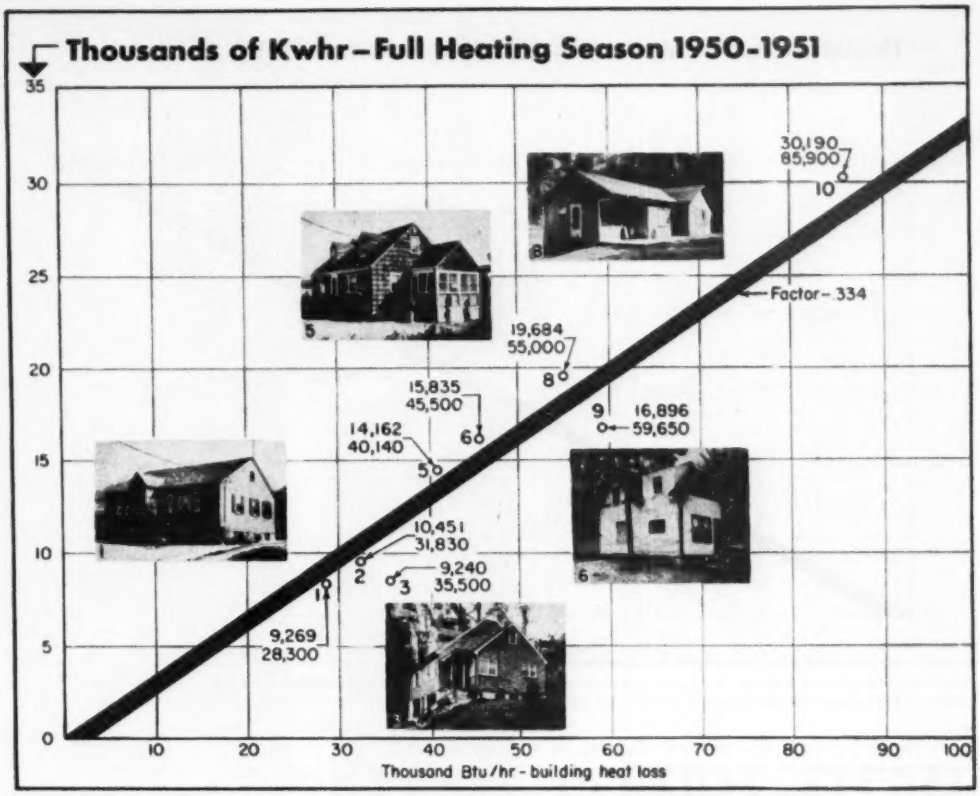
The contained space of a house, its "cube," cannot be used as basis for calculating annual electricity usage or cost.

These conclusions result from a series of field tests on electric panel heating made by the Westchester Division of the Consolidated Edison Co of N. Y., Inc.

Data Where Needed . . . In Westchester County during the past three years, there has been a considerable promotional effort by manufacturers to sell electric panel heating, particularly glass panels. Our company had taken a neutral position in regard to this type of load. However, it was felt that it was essential to have authoritative information as to operating cost in order to talk intelligently with our customers. The company was also interested in forming an opinion as to the potentialities of this load in order to judge whether it would be an important factor in our future load growth. Consequently, it was decided to make field tests of a representative number of residences in which electric panel heating had been installed and interview the owners periodically to obtain first hand information as to its use, advantages, and disadvantages. Tests for the 1949-1950 heating season covered five residences. During the 1950-1951 season eight residences were under test.

It was desired to determine:

1. Whether or not a consistent relationship existed between the heat loss of the house and the kwhr required to heat it by electric panel heating, and if so, what this relationship actually was.



ENERGY USE per Btu per hour heat loss worked out to a lower figure, 0.334 kwhr, in the 1950-1951 season when eight houses were included

Electric House Heating

A. L. CARROLL and **B. J. NIMPHIUS,**
Consolidated Edison Co. of N. Y., Inc.,
Westchester Division, Mount Vernon, N. Y.

2. The economic relationship between electric heating and heating by gas or oil.

3. The customer reaction to electric heating, aside from cost considerations.

4. Whether or not users of this type of heating felt comfortable at lower room temperatures than with conventional heating systems.

5. The difference in operating cost, if any, between the ceiling type of installation operating at relatively low surface temperature and the wall type unit which operates at a relatively high surface temperature.

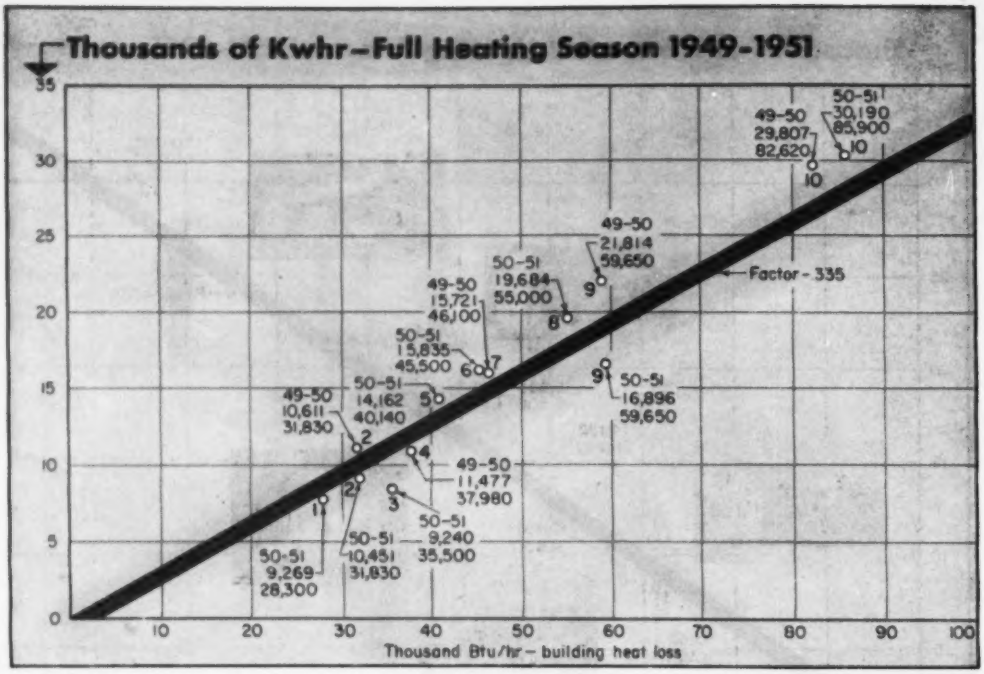
Method of Test . . . In each house the heating load was segregated and measured separately. Recording demand charts and kwhr readings were taken for the entire heating season. All results were adjusted to a heating season of 5,090 degree days which temperatures of the past 20 years indicate to be normal for this part of the country.

In order to relate the results of these field tests to information generally available in the heating industry, it was decided to show the relationship between the heat loss of the house on a 0 deg day and the annual kwhr required in a normal heating season. In this territory heating installations are designed to carry the heating load on a 0 deg day. The Btu heat loss on a 0 deg day, therefore, becomes the design temperature. Another way of stating this fact is to say that the heat loss on such a day is a measure of the magnitude of the heating job

Table I—Estimated Annual Heating Cost for Normal Heating Season of 5,090 Degree Days

House	Heat Loss Btu/Hr	By Electricity		By Gas*	By Oil at 12¢
		at 2¢/Kwhr	at 3¢/Kwhr		
A	30,000	$201.00	$301.50	$102.15	$97.75
B	40,000	268.00	402.00	135.14	127.00
C	60,000	402.00	603.00	201.10	185.00
D	80,000	536.00	804.00	267.00	244.00

* Gas costs were figured on the first 32,000 cu ft of 537 Btu gas at 90¢ per 1,000 cu ft. The remainder at 80¢



RELATIONSHIP between heat loss and annual consumption of electricity for heating approximates a straight line of 0.335 kwhr per Btu per hour. Top figures at each point indicate heating season. Next are kwhr per season and at bottom are Btu losses per hour

to be done in a given house. Methods for determining the heat loss are well established in the heating industry. These methods are explained in detail in the "Heating and Ventilating Guide" published by the American Society of Heating and Ventilating Engineers, which is generally recognized as a standard throughout the industry.

In determining the heat loss of a specific house, the type of construction, the size of the rooms, the amount of glass, the kind of insulation, the presence of storm windows, weather stripping, and other factors having a bearing on the heat required were taken into consideration.

From the Tests . . . The results of the tests covering the two heating seasons 1949-1951 are shown in the charts in which annual kilowatthours required in a normal heating season are plotted against the hourly heat loss.

The first chart shows 0.346 kwhr per Btu per hour heat loss. The second, 0.334 kwhr. The third chart is a composite of the others. Here the combined figure is 0.335 kwhr.

Ceiling panels are installed in two of the houses, No. 2 and 10. In the others wall panels are used.

Customers' Reactions . . . In some cases the customers expressed definite dissatisfaction because the operating cost was considerably higher than they had been led to expect. In many cases, however, the customers expressed satisfaction with the results obtained from a heating standpoint, aside from the question of cost. And in some cases the customers were completely reconciled to the cost because of the advantages which they felt the system had. Advantages referred to by customers were quietness, cleanliness, flexibility, and lower first cost as compared with usual heating methods.

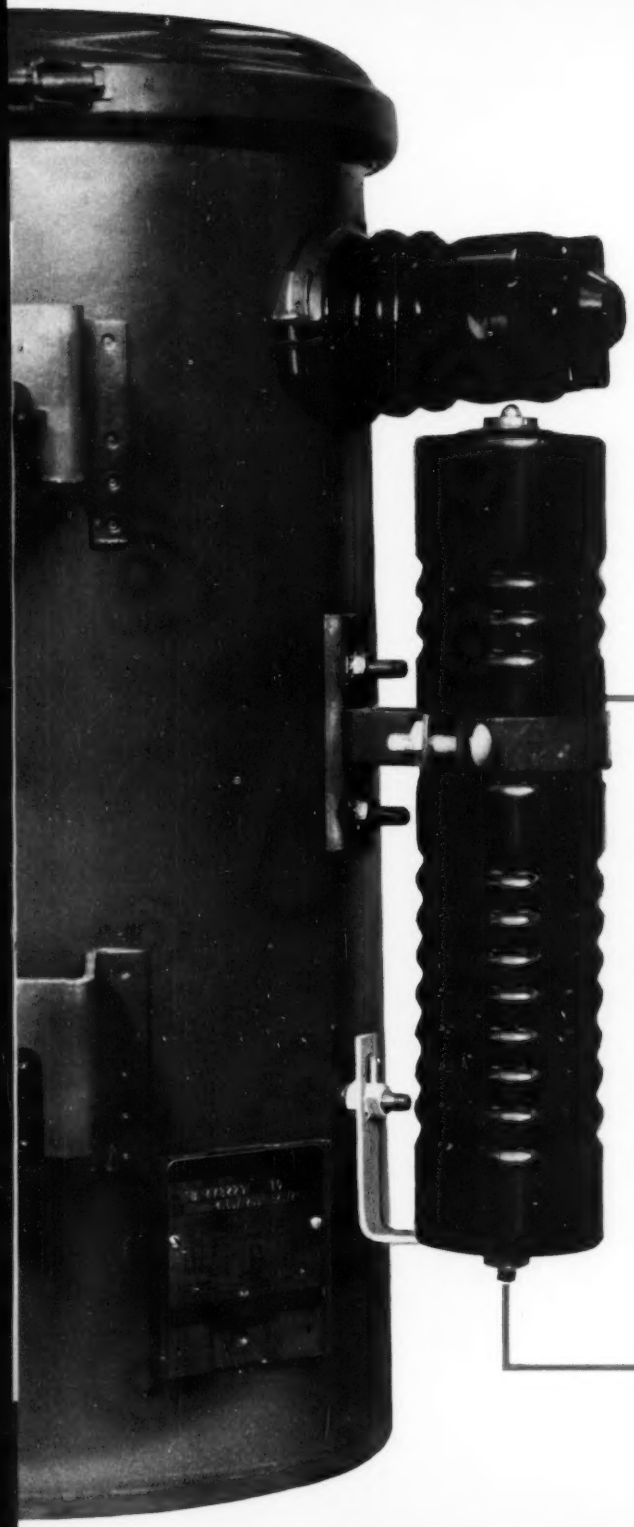
No evidence was found to show that lower temperatures are generally acceptable with this type of heating equipment as compared with the conventional types of heating systems.

It should be recognized in considering the cost of service for heating by electricity that it is a load of relatively low annual load factor. Any substantial increase in this load may well require a utility to revise the form and level of applicable rates.

Table II—Electric Heating Energy Use Unrelated to Cubic Volume of House

House	Heat Loss Btu./Hr.	Cu. Ft. Vol.	Heat Loss per Cu. Ft.	Kwhr.	Kwhr./Cu. Ft.
1	28,300	8,130	3.5	9,969	1.14
2	31,830	8,610	3.7	10,611	1.23
3*	35,500	6,480	5.5	9,240	1.42
4	37,980	6,750	5.6	11,477	1.77
5	40,140	6,050	6.6	14,162	2.34
6	45,500	8,310	5.5	15,835	1.91
7	46,100	7,190	6.4	15,721	2.19
8	55,000	8,000	6.9	19,684	2.46
9	59,650	16,950	3.5	21,814	1.29
10	85,900	26,590	3.2	30,190	1.14

* The living room of this house was not completed at the beginning of the heating season and was not heated until it was finished.



GENERAL ELECTRIC announces two improved transformers

SEE NEXT PAGE

Improved conventional HS transformer

NEW TANK-WALL BUSHINGS. High-voltage bushings of heavy porcelain mount directly on tank wall. Electrical characteristics are improved; cable can be brought in from either side for easier connections.

NEW INSULATED CLAMP-TYPE CONNECTORS eliminate exposed live parts—permit safer, faster connections *without* tools. Cap cannot drop off when unscrewed.

NEW STAINLESS-STEEL CLAMPS hold Nitrile bushing gaskets firmly in place to make an oil-tight seal that helps prevent transformer "breathing" and prolongs oil life.

These "extra-service" features retained.

ONE-PIECE COVER BAND produces uniform gasket pressure around the entire rim—facilitates inspection, maintenance.

NITRILE GASKETS at every opening—cover as well as bushings—assure air-tight sealing. Nitrile gaskets need no adhesives—can be re-used.

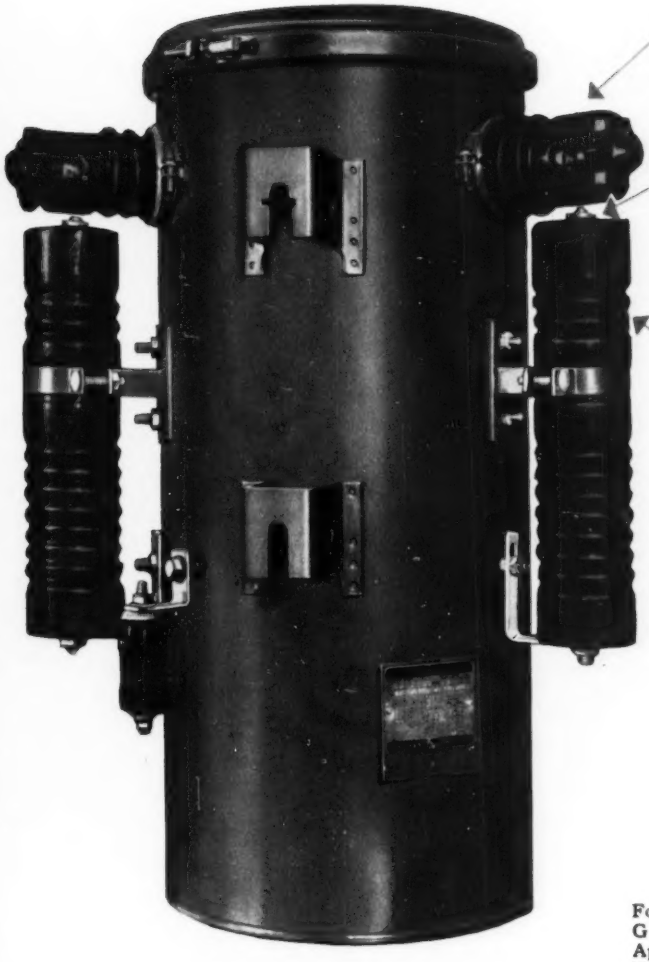
MELAGLYP PAINT FINISH. Two baked-on coats provide superior resistance to weathering, water absorption and abrasion.

SPIRAKORE* DESIGN with its lower losses—greater short-circuit strength—superior regulation—savings in weight.

* Reg. trademark of the General Electric Company

GE SPIRAKORE* transformers give extra years of service

Improved unit-type HSBA transformer



NEW TANK-WALL BUSHINGS are combined with externally-gapped arresters, an internal high-voltage fuse, and low-voltage circuit breaker to give maximum protection and ease of installation.

NEW EXTERNAL GAPS isolate the new G-E Pellet arresters from the high-voltage leads. Elimination of the positive electrical connection keeps the arrester at ground potential. The internal gap is retained to protect the arrester in case the external gap is shorted.

NEW PELLET ARRESTERS are valve-type arresters which offer unlimited interrupting capacity. You can apply the new HSBA transformers *anywhere* on the system without regard to system short-circuit current. The new arresters also have a combination of low sparkover voltage and low IR drop that holds lightning voltages to extremely low levels, providing an unequalled margin of protection. Because valve-type arresters are not eroded by discharges, the protection lasts *indefinitely*.

OTHER FEATURES. In addition, the HSBA transformer has all the advantages of the HS transformer including Nitrile sealing, a one-piece cover band, superior paint finish, Spirakore design.

For more information about these improved G-E transformers see your nearest G-E Apparatus sales office. Or write General Electric Company, Schenectady 5, New York.

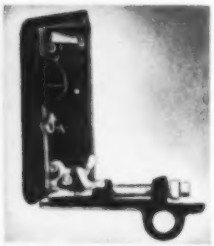
402-125

GENERAL ELECTRIC

Four cutouts in one

by simply changing doors

Indicating



Drop-out

Reclosing

Disconnect

A G-E FEATURE SINCE 1937! By stocking only three interchangeable doors which fit both 5.2- and 7.8-kv, 50-ampere housings, you get the 4 operating functions illustrated at the left. Available also in 100-ampere ratings, this unique flexibility reduces inventory and simplifies stocks.

INDICATING OR DROPOUT WITH A TWIST OF THE WRIST! A small wire yoke, easily inserted or removed, determines whether the fuseholder door "kicks out" at the bottom for visual indication, or drops open—either way giving positive evidence of a blown fuse.

RECLOSING DOOR AVOIDS UNNECESSARY SERVICE TRIP! The two-element reclosing door restores service within one second after a temporary fault blows the first fuse link. By saving a service trip, the two-shot cutout pays for itself the first time it operates!

FLEXIBLE DISCONNECT BLADE CAN'T GET LOST! It's fastened to the door—can't be misplaced. This disconnect blade doubles the continuous current rating of the cutout. When the blade is disconnected and the door closed, the flexible cable extends downward to indicate that the circuit is open.

WHAT'S MORE THE CUTOUT IS LIBERALLY DESIGNED —has high dielectric strength, uses silver-plated contacts, provides full-range interruption of fault currents, and is conservatively rated. All live parts are completely enclosed for maximum safety.

For complete information contact your G-E Apparatus sales representative, or write for Bulletin GEA-3448. General Electric Company, Schenectady 5, N. Y.

4/6-44

GENERAL ELECTRIC

AUTOMATIC FEED HANDLING and grinding machine is compact unit on one side of driveway through the crib. Robert Lynch, owner of the farm and a graduate of the University of Illinois Agricultural College, is shown operating grinder. Parts identified are: (1) ear corn equipment; (2) supplement elevator; (3) storage bin and chute for supplement; (4) metering unit for supplement; (5) chute for oats; (6) chute for shelled corn; (7) metering cylinders; (8) auger conveyor; (9) hammer mill; (10) surplus air return to mill; (11) ground feed storage bin; (12) bagging unit for ground feed; (13) discharge from grinder to wagon; (14) control box and (15) time clock

Automatic Feed Handling and Grinding With Small Motors

Saves farmer's time, eliminates need for 3-phase lines for feed grinding motors, and cost is only ½¢ per 100 lb of feed ground and handled

HARRY L. SPOONER, Peoria, Ill.

Small-motor feed handling and grinding has been made practical by the development of equipment that does the job automatically. Since the farmer's time is not taken up with looking after the grinder while it is in operation, he is not too much concerned with how long it takes so long as enough feed is ground in the daily feeding cycle.

This new piece of farm machinery takes grain from bins in the crib and grinds and mixes it according to a pre-determined formula which has been set up on the control dials. Amount of feed required at a given time is controlled by setting a time clock. When the proper quantity has been ground, the machine stops automatically. Several small motors are incorporated in the design.

Two Operations . . . Mechanisms for grinding, measuring, and mixing feed consist of two major parts—one for ear corn grinding and the other for feeding oats, shelled corn, and supplement into the machine. The units are arranged as a compact unit on one side of the driveway through the crib.

The ear corn bin at the rear of the supplement room is a hopper-bottom affair, holds 400 bushels, and has a chain drag at the bottom which feeds corn into the grinder. The supplement room has a door opening on the driveway. Just in front of this door and at one side is a hopper into which the supplement is dumped from the bags. A home-made belt and cup elevator takes it from the hopper to a bin, located behind the blender, which holds about 1,000 lb of supplement.

Chutes from the oats, shelled corn, and supplement bins extend to the blending unit near the floor of the driveway. The chute from the supplement bin is a wide one and is located back of the other two chutes, its opening at the bottom being between the openings of the other two.

Feed Proportions . . . The ratio of the various ingredients in the mixture is predetermined. Below the chute open-

ings of each of the three ingredients used, is a metal metering cylinder. This measures the amount of the ingredient by means of a slit along its side partially covered with a small metal gate. These gates, 28 in number, are of various lengths, designed to cover any amount of the slit desired so the remaining opening in the cylinder allows just the right amount to pass through.

The operation is a continuous one, not a "batch" proposition, and the openings remain the same until a change is made in the settings for the formula. A control lever at the bottom of each ingredient chute permits the closing off of any of the ingredients entirely and the use of only the remaining ones. Ingredients drop from the metering cylinders into an auger conveyor, along with the ear corn if any of this is used, and are carried into a small hammer mill for grinding and mixing.

Special Additives . . . A small metal storage bin with funnel bottom and automatic metering device can be used for adding antibiotics or anything else needed only in small quantities. As little as ½ lb per 100 lb can be mixed in the feed rations. The items used drop into a funnel at the throat of the hammer mill.

Also located in the throat of the hammer mill is a large magnet that pulls out any pieces of metal or nails that get into the feed.

Automatic Feeding . . . Ground feed is blown from the hammer mill through a discharge pipe. By means of ropes, which may be manipulated from the floor, valves of a series of Y's in the discharge pipe can be operated so the feed can be blown through a pipe into the self-feeders for hogs located in the feed lot adjoining the crib or into a dust collector on the second floor. A time clock can be set for whatever time is necessary to fill the self-feeders or other storage places.

From the dust collector, the feed, by a series of Y's operated by ropes, is distributed three ways. One of these is to a storage bin extending from the ceiling almost to the floor, which has a hopper bottom with opening. Or the feed may bypass the storage bin and go into a chute which has a bagger at the bottom.

The third direction is to a dump box overhead for use in loading wagons. This box, or bucket, trips automatically when there are 95 lb of feed in it. A special attachment under the bucket divides the feed between the front and back of the wagon so it is not necessary to move the wagon while loading.

Small Motors . . . The hammer mill is operated by a 5-hp motor. A 1/3-hp motor operates the chain conveyor from the ear corn bin, blender, and auger. By means of two clutches, this motor can be changed to run either the ear corn unit, the blending unit, or both. A 1/50-hp motor operates the small storage bin for antibiotics. A 1/3-hp motor operates the agitator in the ear corn bin.

Automatic controls are the key to the whole operation. The equipment can turn out as much as 1,750 lb of uniform mixed feed in an hour. By setting time controls, the farmer can leave the crib and do other chores while feed is being mixed, ground, blown out to self-feeders or loaded in a wagon. For instance, one of the self-feeders for hogs takes a half hour to fill. By setting the time for a half hour the farmer can go away knowing the feeder will be full and the machine shut off when he gets back.

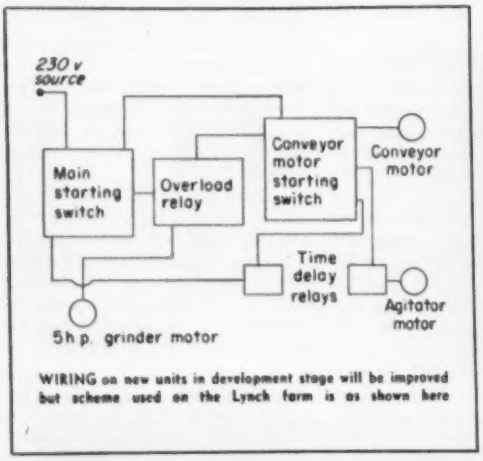
A relay protects the 5-hp motor in case a jam of feed overloads the grinder. Another relay turns off the grinder if the feed stops flowing. If ear corn jams, a motor-driven agitator starts automatically to shake it loose.

Energy cost is ½¢ per 100 lb of feed ground.

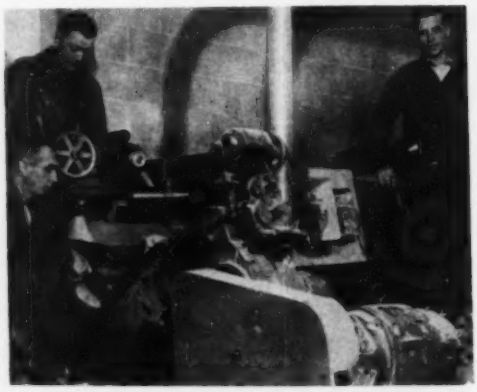
The grinder is in the experimental stage and cost of the equipment is not yet available.

Sponsored by Public Service Co of Northern Illinois, the experimental installation was made on the Robert Lynch farm in Marshall County. Mr. Lynch is a graduate of the University of Illinois College of Agriculture. He raises 250 hogs and 3,000 turkeys annually and feeds 60 head of cattle. The experiment was conducted by the University of Illinois in co-operation with the U. S. Department of Agriculture.

Experiments are being continued, and it is anticipated that a better automatic grinder will be developed on the basis of experience with the installation on the Lynch farm.



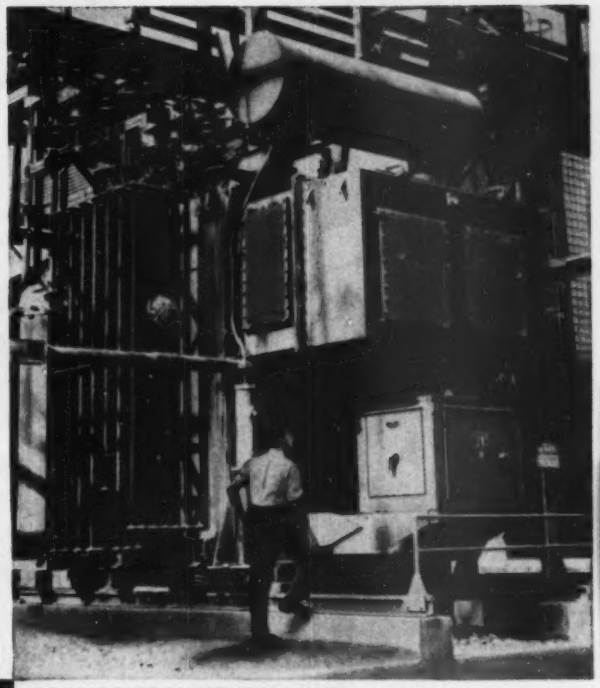
WIRING on new units in development stage will be improved but scheme used on the Lynch farm is as shown here



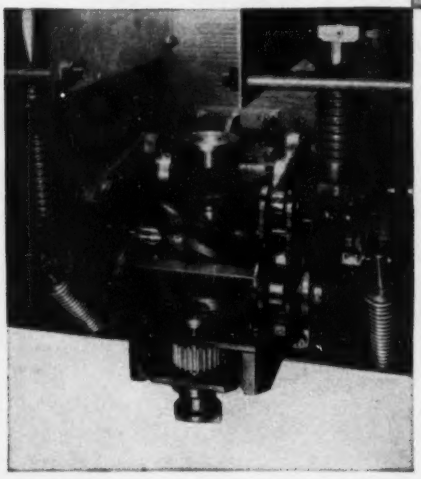
FARMERS came from distant points to see machine in operation. Left to right, are John A. Crow, Toulon, Ill; Augustus E. Trowbridge, Edelstein, Ill; and Wm. Reynold, Dunlop, Ill.

No appreciable mechanical wear after 1,017,706 tap changes

G-E load-ratio-control averages 800 tap changes a day at Alcoa plant



G-E LOAD-RATIO-CONTROL TRANSFORMER rated 40,000 kva (output) 13.8 kv, installed at Alcoa's Vancouver plant, provides ±5% voltage regulation.



MILLIONS OF TROUBLE-FREE OPERATIONS are built into this hardened steel cam assembly—typical of the mechanical strength of G-E load-ratio-control. Each new LRC design must pass mechanical-life tests of several million operations before it can be approved for production.

The load-ratio-control equipment on this transformer really has to "take it." Installed on January 16, 1946, it has already completed more than a million tap changes under load! At its last inspection on January 17, 1951, Alcoa found the LRC mechanism in excellent working order. None of the mechanical parts—bearings, pins, cam rollers or cam surfaces—showed appreciable wear.

Without a rugged mechanical system, the toughest electrical parts would be worthless. That's why every new LRC design must pass mechanical-life tests equal to at least 30 or 40 years of ordinary service!

Requires less routine maintenance, too!

With G-E load-ratio-control, you don't do any *unnecessary* service work. The instruction book which accompanies each unit tells how many operations you can expect the LRC equipment to perform before you have to replace contact tips and clean insulation.

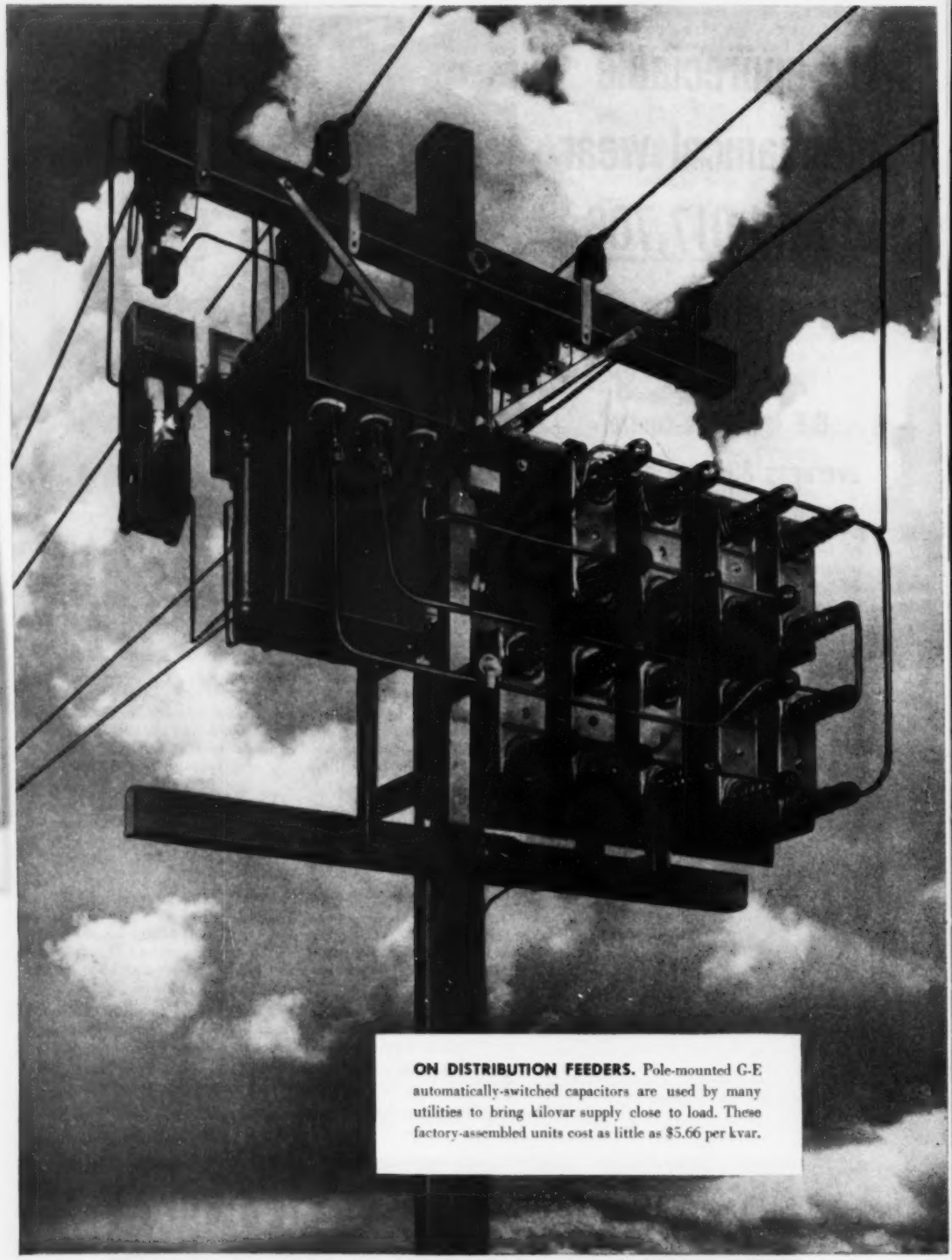
This means you can eliminate unnecessary inspections. Simply refer to the instruction book and read the operations counter to schedule maintenance only when it is needed!

Over 39,000,000 installed kva have proved that General Electric LRC is as reliable as the core and coils themselves.

General Electric Company, Schenectady 5, New York.

401-21

GENERAL ELECTRIC



ON DISTRIBUTION FEEDERS. Pole-mounted G-E automatically-switched capacitors are used by many utilities to bring kilovar supply close to load. These factory-assembled units cost as little as $5.66 per kvar.

Peak-load capacity released quickly economically by G-E switched capacitors

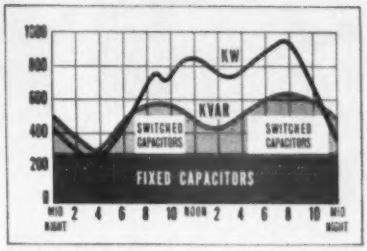
Capacitor equipments can be supplied on short delivery . . . some at a cost of less than $6.00 per kvar . . . installed in a matter of hours

Capacitors continue to provide one of the fastest, cheapest ways to release system capacity. By raising voltage levels and reducing system current for a given load, they can free the system for the delivery of more kilowatts—at a fraction of the cost—and in a fraction of the time—it would take to add new system capacity.

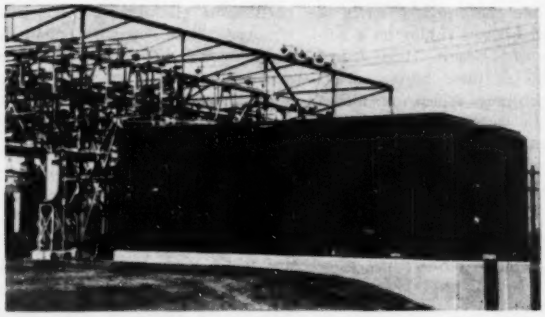
Where you have already installed a high percentage of fixed capacitors—or where your kilovar loading varies widely in any 24-hour period—it will pay you to investigate the use of switched capacitors to alleviate peak conditions.

Automatically-switched General Electric capacitors can be supplied on short delivery—for as little as $5.66 per kvar. They can be installed on your distribution feeders or at the substation—in a matter of hours. And they provide one of the least expensive methods of releasing system capacity.

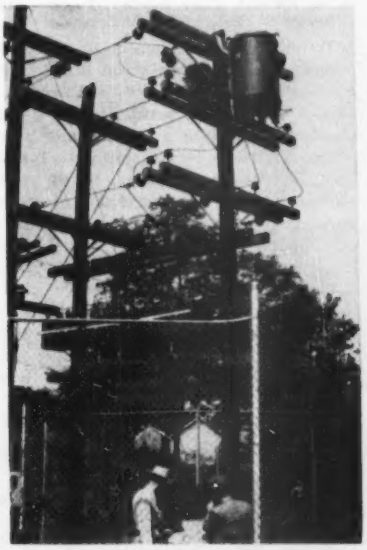
For information on how switched capacitors can help *you* to meet today's climbing loads, call your nearest G-E Apparatus Sales Office. Or write to Section 407-36, *General Electric Company, Schenectady 5, New York.*



FLEXIBLE KILOVAR SUPPLY. Where kilovar loading varies widely in any 24-hour period, G-E switched capacitors can supplement fixed capacitors in providing economical kilovars. (Ruled area shows kilovars furnished by synchronous condensers or system generators.)

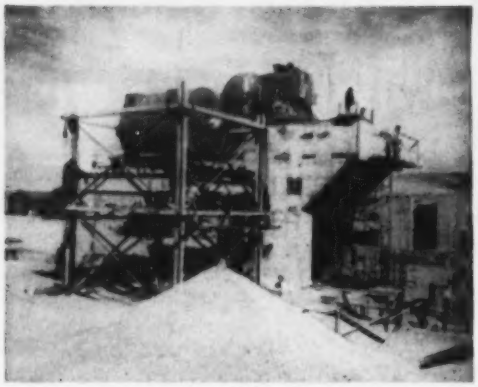


AT THE SUBSTATION. General Electric switched capacitor equipments can be used in large banks to supply bulk kilovars. Completely-enclosed equipments like this 5100-kvar, 13,200-volt bank installed by Metropolitan Edison Co., now cost as little as $7.00 per kvar.

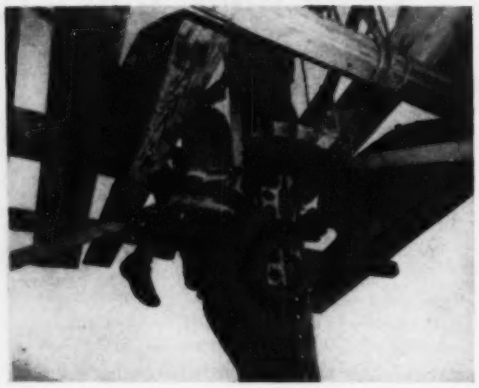


LOW COST SWITCHING. A G-E Type B-1 switch plus capacitors and hangers as used in this 600-kvar, 4-kv capacitor bank by Kentucky Utilities Co. is only $5.47 per kvar.

GENERAL ELECTRIC



UP SHE GOES as 20-ton hydraulic jacks supported by the vertical framework raise the inner movable platform of this simple elevator 4 in. at a time. Public Service of New Mexico saved an estimated $45,000 investment in additional crane capacity by building this



SIMPLE, SAFE OPERATION is one big advantage of the construction elevator. After hydraulic jacks make 4-in. lift, platform is bolted in place and supporting pedestals raised 4 in. for the next lift. The movable platform is positively and evenly supported

Simple Lift Cuts Construction Costs

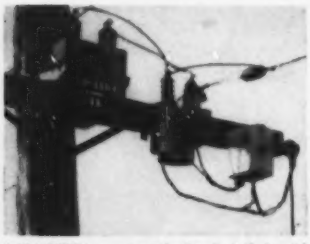
H. A. PERSON, Chief Engineer, Public Service of New Mexico, Albuquerque

To raise heavy equipment up to foundation levels during steam plant construction, Public Service of New Mexico has used a structural steel platform elevated in a simple supporting framework by hydraulic jacks. Total cost of the equipment, which will be used for the construction of three and possibly four units, was only $7,500. This compared to an added investment of $45,000 which would have been required to build enough capacity into the permanent crane in the plant to handle the heavy loads during construction. Since the framework and platform are demountable, the equipment may be rented when it is no longer needed, effectively decreasing its cost and increasing the resulting saving in original investment. This was the deciding factor favoring the lift.

The equipment is simple in construction, and safe in operation. The framework is square, with a heavy vertical H-beam at each corner and structural cross bracing for rigidity. The movable platform is a series of ten parallel I-beams resting on a hollow square of H-beams. Holes drilled in the ends of these horizontal H-beams match holes drilled four inches apart all the way up the vertical H-beams. Heavy bolts through these holes support the platform at any height from the ground up to a height of 24 ft.

Four movable pedestals drilled to fit the holes in the vertical H-beams support 20-ton hydraulic jacks under each corner of the platform. With the jacks in place the bolts supporting the platform are removed, and the platform jacked up four inches. The bolts are reinserted in the new position, supporting the platform, and the jacks removed. Next step is to unbolt the pedestals and move them up to the next position, then repeat the operation. About 37 hours was required to raise a 70-ton generator stator by using this lift.

Series Capacitors Relieve Street Lighting Overload



CAPACITOR was originally installed with relay-operated oil switch to short out unit during starting period. However, studies show this precaution is unnecessary in operation

A. D. FRAGALL, Asst Distribution Engineer, Portland General Electric Co, Portland, Oregon

To relieve overloads on 6.6-amp series street lighting circuits, Portland General Electric Co has adopted use of capacitors in series with the circuits. One year of experience indicates that the plan is satisfactory and effects sizable savings in solving the immediate overload problem.

Majority of series street lighting circuits in the Portland overhead area are served by 30-kw constant current transformers. Even though nearly all of these transformers are fully loaded, requests for additional street lights still come in.

Installation of one standard 2,400-v, 15-kva capacitor in a series 6.6-amp circuit reduces the impedance of the circuit so that rated current can be maintained with as many as 20% (18 to 20) more lamps. This installation costs about $100, or $5 per additional lamp. Compared to the cost of $70 per lamp for creating a new circuit by

(Continued on page 118)

LET'S LOOK AT THE "MK-40"—*your best buy*

AND THE STANDARD OF COMPARISON!

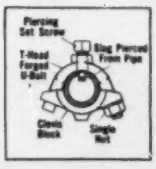
Universal acceptance by operating engineers is abundant proof of the sound engineering principle incorporated in the design which provides ample material for heat dissipation and assures high thermal conductivity.

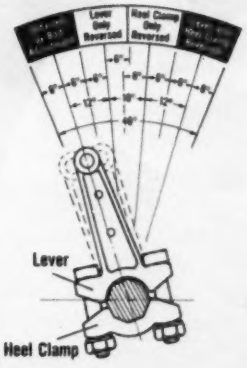
Its simplified construction and improved high pressure contacts at both ends of the blade maintain the highest mechanical and electrical performance under the most severe weather and service conditions.

You can select a Delta-Star group-operated "MK-40" switch for every type of service, from 7.5 through 230-kv and current ratings to 5000 amperes.

OPERATING MECHANISM

Switch and control bearings have greaseless, non-rusting ball bearings insuring free operation under all weather conditions. Self-piercing set screws on clamp type U-bolt fittings eliminate threading or drilling of pipe. Completely adjustable lever can be installed or removed without disturbing rotating insulator.





CURRENT PATH

From terminal to terminal the number of current interchange surfaces are reduced to an absolute minimum. Both ends of the floating tubular blade have the same type of high pressure contact backed by independent pressure applying members. No other moving contact surfaces or springs; everything in plain view for visual inspection.

BLADE MECHANISM

Fully controlled blade is actuated by a 45-degree bearing mechanism replacing cranks, levers, links and cams. It converts motion of operating insulator to a vertical lifting and rotating motion of the blade with just the right mechanical advantage. Blade locks automatically in both opened and closed positions.

CONTACTS

Current carrying function of the contacts is independent of the pressure applying members to permit the use of materials with the best electrical and mechanical characteristics for each function. Hand drawn copper shoes have heavy silver inlays. Long, beryllium copper springs maintain uniform contact pressure and carry no current.

WHEN YOU WANT THE BEST IN HIGH VOLTAGE SWITCHES SPECIFY THE "MK-40"

DELTA-STAR ELECTRIC COMPANY

DIVISION OF H. K. PORTER COMPANY, INC.

2437 Fulton Street • Chicago 12, Illinois

DISTRICT OFFICES IN PRINCIPAL CITIES

"More Power to You".®

through GENERAL CABLE experience and know-how in the manufacture and application of...

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PIONEERS IN ALU

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WIRES and CABLES

Twenty years ago, ALECTRAL pioneered the use of aluminum as a conductor for all purposes. The name was assigned to wires and cables of high tensile strength *aluminum*, engineered as solid or stranded conductors for transmission and distribution service.

Today General Cable can supply all types of ALECTRAL, including ALECTRAL-ACSR (bare and weatherproof), ALECTRAL Weatherproof ("O.K.", "Peerless", "Tip-Top" and Polyethylene covered) and ALECTRAL Insulated Service Drop and Entrance Cables.

General Cable manufacturing and field experience with aluminum conductors well qualifies our engineers to offer intelligent and practical counsel to the many who are planning to use aluminum conductor cables on current or future projects.

GENERAL CABLE
CORPORATION

EXECUTIVE OFFICES: 420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • SALES OFFICES IN PRINCIPAL CITIES OF THE UNITED STATES

"ALECTRAL", "O.K.", "PEERLESS" AND "TIP-TOP" ARE REGISTERED TRADE MARKS OF GENERAL CABLE CORPORATION

MINUM WIRE AND CABLE

Lighting Overload

(*Continued from page* 114)

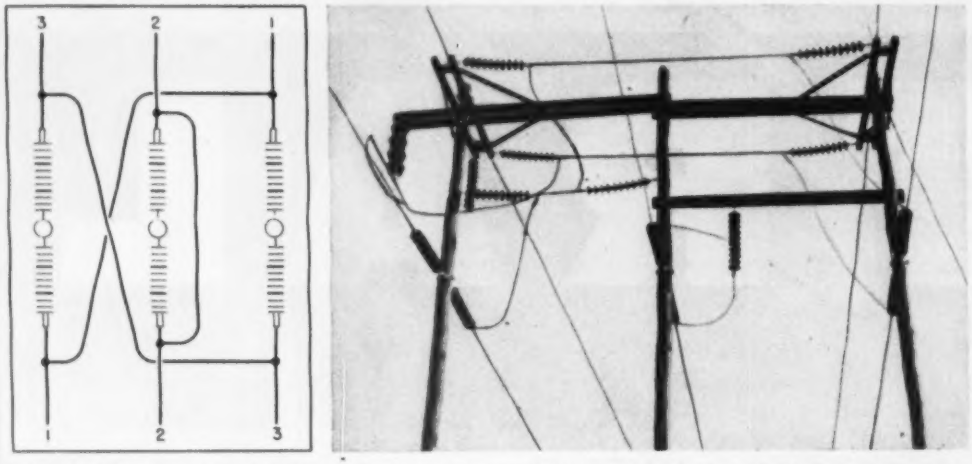
cutting and rearranging series circuits, quite a savings is realized. In addition, many man-hours are saved by this simple installation as compared to the major construction needed for making new series circuits.

Although the savings are substantial, certain risks are involved. Reducing the circuit impedance can result in damage to lamp life because of high inrush currents; damage to constant current transformers due to high voltage and current during starting, or mechanically when coils are thrown violently apart. Transformer regulation range is also reduced.

There are two ways to reduce high inrush currents and undesirable voltage conditions. In manually operated substations with station dry type transformers, the operator can latch the coils apart and release them after the circuit is energized. On automatic substations using pole-type transformers, a small crossarm-mounted oil switch has been used to short out the capacitor during starting. This switch was relayed to open immediately after the inrush period, cutting the capacitor back into the circuit. However, studies indicate that these precautions are not essential for satisfactory operation. These studies were made by using oscillograph charts with and without these two arrangements, and lamp life tests were based on the charts.

To avoid over-voltage as far as possible in the event of a short on a section of the circuit, the capacitors are located near the mid-point of the circuit. They are mounted on the same arm as the ungrounded street light circuit and are cut directly in without any fuse protection.

Present feeling is that reduction of the construction budget by $30,000 to $40,000 annually warrants continuation of the experiment and justifies the small risk involved. Additional experience will be required before the method can be evaluated as anything more than an expedient to relieve overloaded conditions during a period of material and manpower shortages.



TRANSPOSITION of two outside phases of a single circuit 110-kv transmission line. Circuit consists of three 397,500-cir mils ACSR conductors arranged in flat configuration. Circuit is protected by two 101,800-cir mils ACSR ground wires. Polarity at transposition structure is shown in sketch. Wood pole construction as employed in the line was readily adaptable to provide simple, safe transposition

Phase Transposition Is Inconspicuous on 110-kv Line

J. G. HLAVAC, Transmission Engineer, Central Hudson Gas & Electric Corp, Poughkeepsie, N. Y.

Correct phase relation to complete a 115-kv transmission loop was effected by transposition of conductors at an existing full dead-end structure. Transposition was made by six jumpers and loops. Wood pole construction as employed in this line was readily adaptable to provide simple, safe, and inconspicuous means for obtaining the transposition.

Construction involved was H-frame flat configuration. Phase relations at the terminals were reversed and could not be changed at these terminals without considerable complications. H-frame flat construction as planned did not provide simple means of transposing conductors.

Features of the transposition structure are: All jumpers and loops are either short or firmly supported, thus providing adequate clearances. A Copperweld rod was attached to top of each of the three poles for direct stroke protection. These rods are tied together by a bonding wire, which is carried underneath and along side of the top double crossarm. This bonding wire is grounded through a Copperweld side guy.

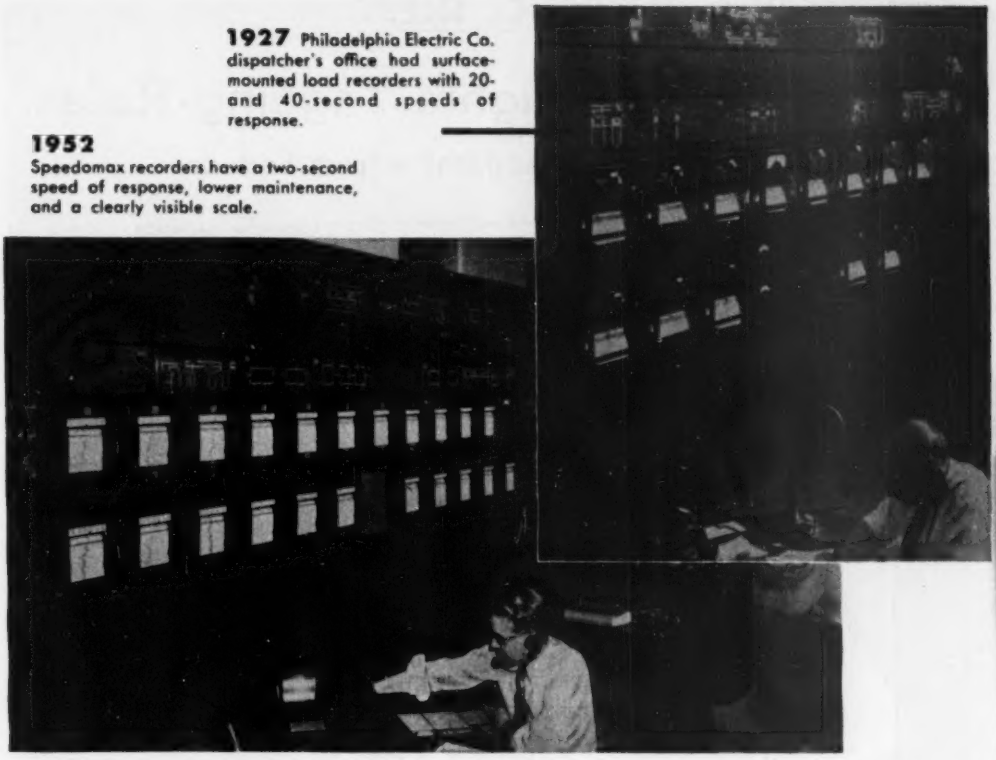
All connections were made directly between compressed dead-ends or dead-end clamps. Use of tap connectors was avoided. Two of the longest loops are reinforced by pieces of aluminum tubing slipped over the conductor.

The entire job was installed by a 7-man line crew in less than one day.

The accompanying illustrations show the transposition required and how it was done.

1927 Philadelphia Electric Co. dispatcher's office had surface-mounted load recorders with 20- and 40-second speeds of response.

1952
Speedomax recorders have a two-second speed of response, lower maintenance, and a clearly visible scale.



25 years in the making...

If you had been a load dispatcher in the Philadelphia Electric Co. operating room back in 1927, you would have had system information that few men could match. With Leeds & Northrup load recorders to focus system operating data before your eyes, you were ready for problems in meeting customer demand, allocating generation for optimum economy, and maintaining proper interchange with your neighboring utility in Delaware.

Today, the equipment in that same dispatcher's office has grown out of 25 years of actual operating experience. It reflects the refinements of system operating techniques made by Philadelphia Electric and many other utilities. These refinements were a major factor in the continuing improvement of the original L&N telemetering equipment, and the development of additional instruments totally unknown 25 years ago. Result: the change from the old to the new has been a carefully planned transition—not a makeshift "advance."

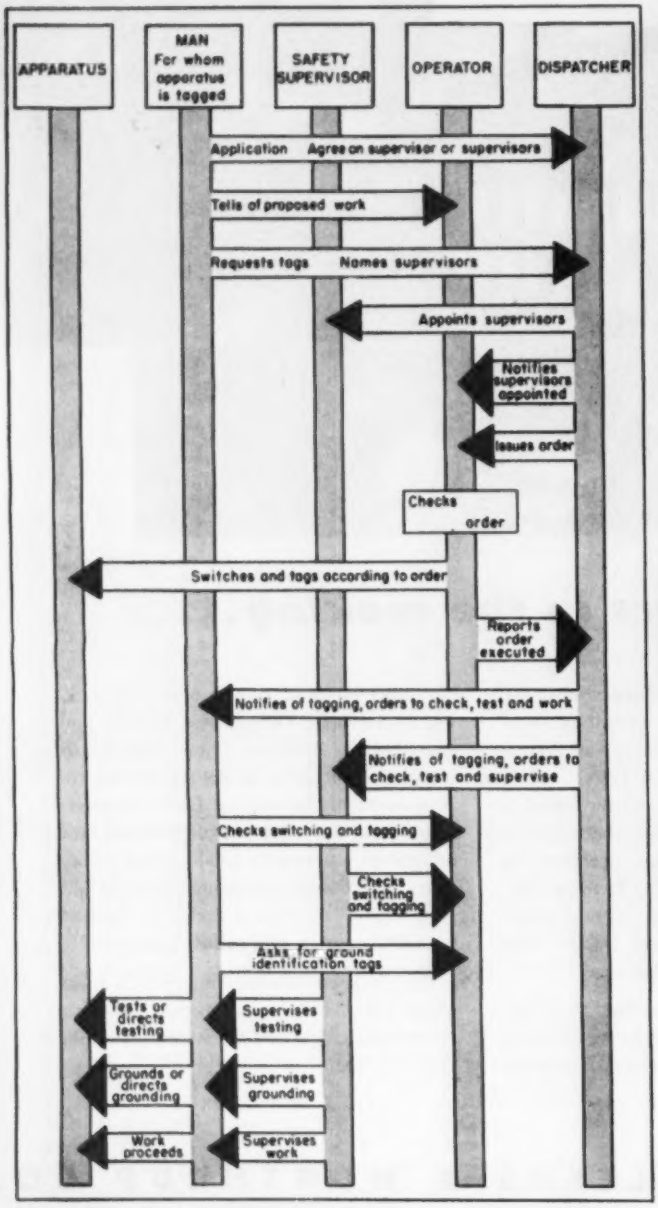
For data on telemetering which is in phase with utility requirements, write to our nearest office, or 4938 Stenton Avenue, Phila. 44, Pa.

LEEDS & NORTHRUP CO.
INSTRUMENTS • AUTOMATIC CONTROLS • FURNACES

Jrl Ad ND46-58-461(5)

Flow Chart Highlights Tagging Rules

Part I—Steps In Removing Apparatus from Service



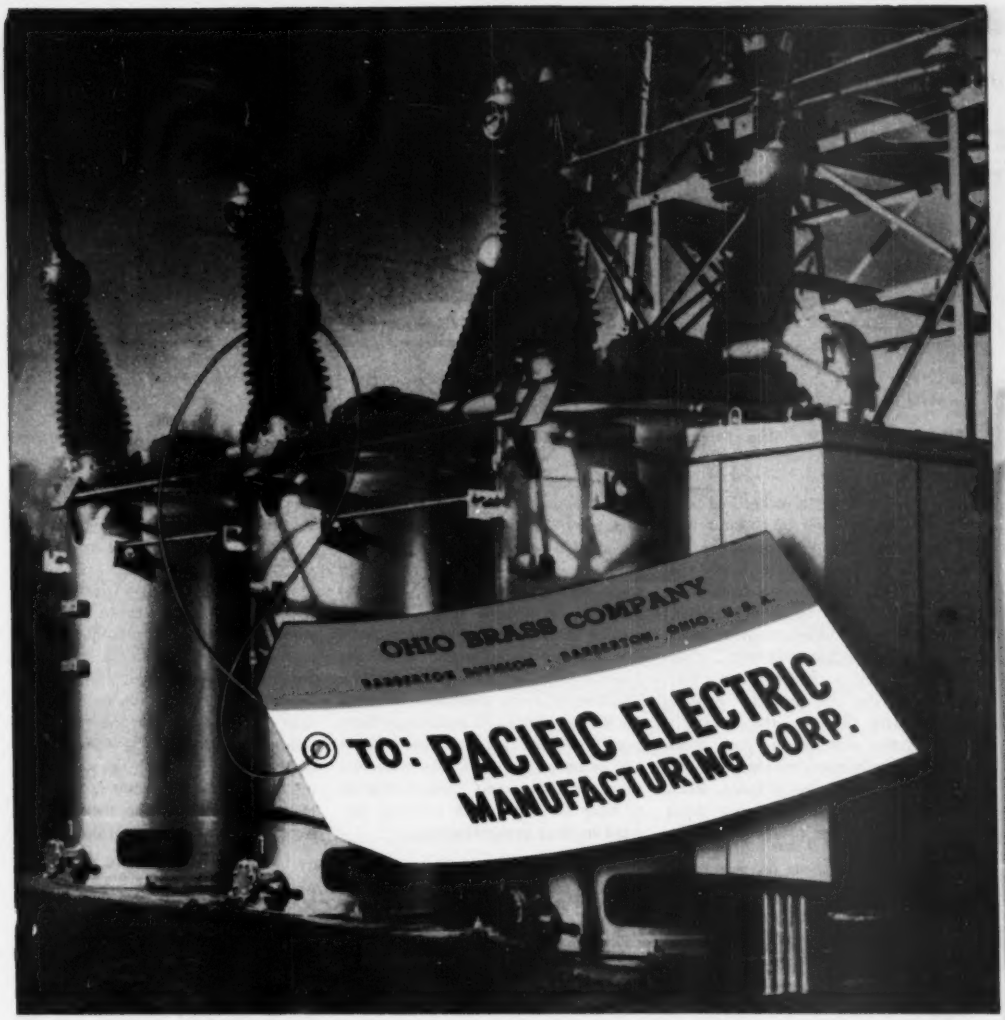
JOHN W. GRONBECK, Superintendent, Electrical Operation, The Narragansett Electric Co, Providence, R. I.

Chart outlines procedure for removal of equipment from service and for placement of red tags. This flow-diagram, used by The Narragansett Electric Co, is based on New England Electric System's tagging rules to safeguard men and to govern work on electrical equipment. Another chart gives procedure for removal of tags and restoration of equipment to service. (See ERS No. 52-10; EW, May 19, 1952)

The Narragansett Electric Co.
SAFETY FIRST
Before working on any apparatus, conductor or cable it is your duty to test the equipment for potential and ground, and short circuit it as required by the tagging rules

Contents on opposite sides of red colored tag

RED TAG
Switch No.
Station or place — Date
Apparatus protected
Tagged for — At
By operator — Ordered on by
Ordered off by — By operator
At — Date
Safety supervisors



One of several 115-kv oil circuit breakers supplied to a large Western system by the Pacific Electric Mfg. Corporation. According to its builder . . . "each entrance bushing of this circuit breaker is mounted on an adapter flange which has a spherical-ring undersurface that rests upon a similar surface of the transformer-pocket flange. This greatly facilitates field installation of the bushings and contact structures attached to them because selective tightening of the flange bolts will shift the bottom of the bushing to any desired position. Other Pacific Electric features include closing by stored energy in motor-compressed springs, improved arc extinguishment," . . . And

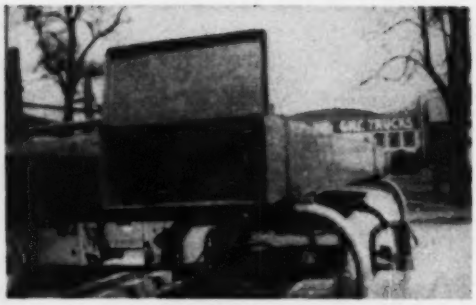
Ohio Brass

MANSFIELD • OHIO

O-B BUSHINGS

ONE OF THE FINEST COMPONENTS OF ANY CIRCUIT BREAKER

HOT LINE TOOL BOX mounted on this small service truck is designed to protect the tools, provide safe, compact transportation



DIVIDED COMPARTMENTS in metal carrying case are made of masonite sides, pine board divisions. Cloth padding keeps tools dry

Custom-Made Cases Keep Hot Sticks

CEDRIC T. DEXTER, Shop Foreman, Pacific Power & Light Co, Yakima, Washington

Safe transportation of hot line tools has been made easier by new carrying cases designed and made up in the shops of Pacific Power & Light Co. Requirements for the new cases were that they be light-weight yet rugged enough to stand up under all types of weather and working conditions. Conventional canvas carrying bags used previously did not protect the tools satisfactorily against the weather. Compactness was necessary in order to hold a maximum number of tools in a minimum amount of space. Each compartment in the carrying cases needed a lining for protection of the tool handles, and these compartments had to be removable for drying and cleaning of the linings when necessary.

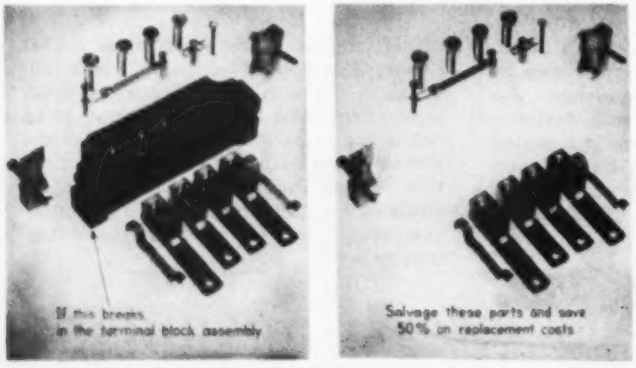
To enclose the tools, 18-gauge metal boxes 9-ft long were made up in a tin shop. Boxes were made in two sizes, the larger one holding eleven tools for the line trucks, and the smaller one holding seven tools for service trucks. A hinged door closes one end of these boxes, while the other end plate is fastened with 6 small metal screws which can be taken out if the removable inside box liner becomes stuck in the case. Boxes are mounted on the trucks with two metal brackets, and slanted slightly to keep the tools from working forward in their compartments.

Liner sides are made of ⅛-in. masonite. Compartment dividers are of ½-in. pine boards, chosen because of durability and price, as well as for the non-splitting and non-warping qualities of pine. Padding for the tool compartments was made of header cloth, purchased in an automotive upholstery shop and cemented to the smooth side of the masonite panels and to the pine dividers with gray trim cement. To conserve space, liners were made one foot shorter than their cases in order to give enough room for the tool heads, which do not need protection. Each liner will take up to an 8-ft tool handle; compartments for some of the shorter tools were blocked to stop movement.

Save 50% in Cost of Meter Terminal Blocks

A. F. WEBER, Principal Meter Tester, Consolidated Gas Electric Light & Power Co of Baltimore

Critical materials are conserved and at the same time a 50% saving is made in cost of terminal blocks for watthour meters. The reason—we purchase 90% of our replacement blocks without the copper alloy terminals and other hardware that add greatly to cost.



A 50% SAVING on replacement costs of defective meter terminal blocks is made by replacing only the composition part and salvaging metal parts of watthour meter terminal blocks

A large majority of terminal blocks which became defective in service were found to contain reusable terminals. These terminals can be transferred from the defective block to a block purchased without hardware, in less than 5 min. by semi-skilled personnel. Thus, in addition to saving material we are keeping labor cost down.

Net saving realized by the adoption of this practice is estimated to be about 60 cents per block. That value is based on the saving in the cost of the block less the cost of labor required to transfer the terminals from the defective block to a new one.

Cable protection—plus Maximum Strength—with

Penn-Union MULTIFIT Connectors

The design of Penn-Union Multifit Connectors retains the full strength and rigidity of the Everdur bolt. The saddle which provides a wide surface to grip and protect the cable is permanently fastened to the U-bolt; one piece. The strongest and most satisfactory fitting of this type. High copper content alloy; Everdur Nuts and Lockwashers as well as Bolts.

★ Each Multifit Connector takes a wide range of conductor sizes; only a small stock will provide for many needs. Made in a complete range for cable up to 2,000,000 cm.

The Penn-Union line also includes numerous other types of Tees, Lugs and Straight Connectors, as well as Service Connectors, Bus Supports, Grounding Clamps, Cable Taps, etc., etc. Experienced users have found that the Penn-Union mark on a fitting is their best guarantee of satisfactory performance.

Sold by Leading Wholesalers

PENN-UNION ELECTRIC CORPORATION

Erie, Pa.

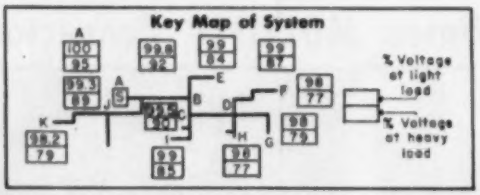
Canada: Dominion Cutout Co., Ltd., 250 Richmond St. West., Toronto, Ontario

THE *Complete* LINE OF CONDUCTOR FITTINGS

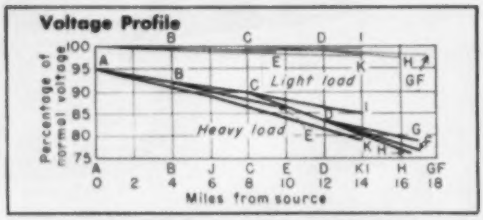
PENN-UNION

Three Steps to Improve Regulator Applications

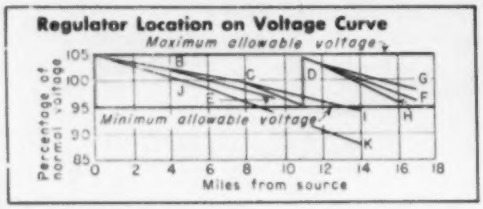
H. C. BREM, Engineer, Allis-Chalmers Mfg Co, Milwaukee, Wisc.



PREPARATION OF KEY MAP of system is first step in procedure



VOLTAGE PROFILE of system for light load and full load, is plotted



REGULATOR LOCATIONS are plotted on system voltage profile

Automatic voltage regulators can be added to distribution circuits with much better results if the following basic steps are taken to determine the proper feeder location for the regulator:

1. Prepare a key map (one line diagram) of the distribution feeder involved.
2. Make a voltage profile of the feeder from the results of feeder voltage readings.
3. Plot regulator location and voltage "boost" on this curve.

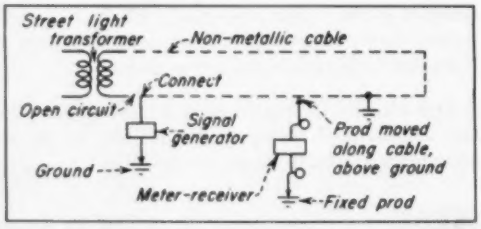
The voltage readings plotted must be taken simultaneously so that light and heavy load conditions can be plotted on the profile. These readings should be taken on the feeder itself to eliminate error due to secondary or service voltage drop.

The key map can easily be prepared from company records. On this is plotted the location of the voltmeters and also the readings obtained. This data is used to prepare the voltage profile, essentially a graph of voltage readings vs distance along the feeder for both light and heavy load readings.

An X-ordinate is then drawn in at the minimum acceptable voltage, usually minus 5% of nominal voltage. The intersection of this line and the curves gives the distance from the substation at which the regulator should be installed to provide adequate voltage. The process is repeated in the event that the one regulator is not capable of providing satisfactory voltage at the end of the feeder.

The "buck" characteristics for the regulator can be used to advantage when capacitors are on the system. At light loads, high voltage due to capacitors can be reduced to allowable limits by this feature of the regulator.

LINE-TO-GROUND FAULTS in non-metallic cable buried in the earth or under concrete slabs may be located easily through the use of



equipment including a signal generator with ground rod, movable prod, fixed prod, and meter-receiver (over attendant's shoulder)

Locating Ground Faults in Buried Non-Metallic Cable

HERSCHEL THOMAS, Division Superintendent of Substations, Indiana & Michigan Electric Co, Marion, Indiana

The method explained here is applicable only to locating line-to-ground faults in non-metallic series street-lighting cables covered by earth or a concrete slab but not under pavements. This method has been used for eight years, saves time and expense of extensive excavation, is easy to use and, in most cases, locates ground within two feet of the fault. The method uses this equipment:

1. Western Electric Type 20 C generator transmitting a broken 400-cycle signal which produces a tone easily identified among other noises.

2. Receiver—simple 2-stage audio amplifier with head phone and meter attachment, used separately or together. Head phones are light-weight under-the-chin type, ideal for elimi-

Built to Resist Corrosion & Flooding

NETWORK TRANSFORMERS

TO MEET A GROWING LOAD DEMAND, this 500-kva Allis-Chalmers network transformer is going into service in the heart of a Nashville business district.

Ruggedly built to operate under tough operating conditions, it's designed to withstand temperature extremes, overloads and unusually severe conditions such as flooding or corrosive atmospheres. Where space is critical, its compact design simplifies installation problems and makes periodic inspection easier and quicker.

Today the A-C label is a familiar sight on major electrical systems. One of the best testimonials to dependable, all-around performance of Allis-Chalmers network transformers is the growing approval of utilities and consulting firms throughout the country. Over 1¼ million kva of Allis-Chalmers network transformers are serving on the nation's important electrical systems . . . reflecting a growing acceptance based on a high standard of performance.

Fine workmanship is found in every A-C transformer you buy. Low-loss design is compact. Thermal capacity is high, even for the most severe load conditions. Gauges are conveniently located for best use and visibility. Tanks are sturdily constructed. Welding is external to eliminate crevices.

As protection against corrosion and possible flooding, tank surfaces are shot blasted and then painted with three coats of baked-on phenolic base paint that gives strong resistance to water. Undercoating compound gives additional protection to surfaces most subject to corrosion. Welded-on main cover and switch compartment eliminate gasket maintenance.

Allis-Chalmers builds all three types of network transformers — oil filled, *Chlorextol* liquid filled and sealed dry type. Thus you get an unbiased recommendation on the right network transformer for the right application. And by selecting from standard designs and ratings, you save money and eliminate special engineering.

Why not benefit from Allis-Chalmers wide transformer-building experience. Call in an A-C representative *early* in your network planning stages. Offices in 64 principal cities. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3452

Chlorextol is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Network Transformers — Over 1,000,000 KVA Installed

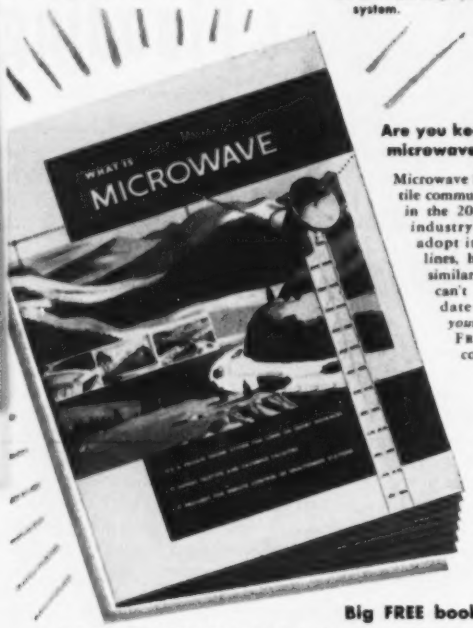
FREE to industrial men...
this big new illustrated book:
"What is MICROWAVE?"

Just off the press! Jam-packed with facts about microwave . . . what it is, how it works, *what it can do for you!* For your FREE copy, mail coupon now!

Here's the beautiful brand-new "how-and-why" book you've been waiting for . . . 20 fact-packed pages that *show you exactly how microwave can help you in your operations.*

Here are 5 of the many subjects covered:

1. **The 4 basic advantages of microwave.**
2. **5 actual case histories showing microwave at work for . . .**
   - **a big power utility.**
   - **a long-distance pipe line.**
   - **a fish and game commission.**
   - **a 300-mile turnpike.**
   - **a 1000-mile Western Union system.**
3. **How microwave operates a pumping station by remote control.**
4. **What goes into a typical microwave system.**
5. **How RCA helps you install your microwave system.**



Are you keeping up to date on microwave?

Microwave is one of the most versatile communication tools developed in the 20th century. No wonder industry has been so quick to adopt it for power lines, pipe lines, highways, railroads, and similar applications. You just can't afford *not* to be up to date on microwave. So get *your own copy* of this big new FREE book . . . mail handy coupon . . . RIGHT NOW!

Big FREE book . . . mail coupon

Communications Section, Dept. 45E, RCA, Camden, N. J.

Without obligation, please send me my own FREE copy of your big brand-new book: "WHAT IS MICROWAVE?"

Name_____ Position_____

Company_____

Address_____ City_____ State_____

Please give me additional information on microwave for the application following:_____

RCA **RADIO CORPORATION of AMERICA**

nating street noises. Meter is a dc 0-1 milliammeter with oxide rectifier.

To locate a line-to-ground fault, the underground cable is opened at some available point and connected to one side of the signal generator whose other terminal is grounded. The broken 400-cycle signal is transmitted along the cable to the faulted spot and returned through the earth.

The receiver is connected by flexible cables to two metal prods. One is stuck in the ground at least 10 ft away from the cable; the other is carried by the user along the cable route and inserted in the ground directly over the cable every few feet. The interrupted 400-cycle tone in the ear phones increases as the prod approaches the faulted spot.

When the meter begins to indicate slightly, it is used alone. Because the 400-cycle is broken, the meter reading pulsates, distinguishing it from other stray ground currents. As the prod approaches the fault, the meter reading increases; after passing the fault, the meter reading will gradually decrease. The fault will normally be found within one or two feet of the spot giving maximum meter reading.

The depth at which the cable is buried has some effect but does not affect the ability to determine a maximum reading. If the cable is buried under a concrete slab, its moisture content will give results similar to those obtained when the cable is buried directly in earth. However, this method will not give satisfactory results when the cable is under asphalt pavement unless contact can be made with earth below pavement.

Pointer Indicates When Violin String Breaks

E. W. SCHWARM, Asst Results Engineer, Tidd Plant, The Ohio Power Co, Brilliant, Ohio

To permit temperature readings when the violin string in a Speedomax recorder breaks and prevents operation of the chart-printing wheel, an improvised pointer and scale have been provided on the recorders.

The pointer is attached to the slide-wire shaft and the slide-wire cover is utilized as a scale by calibrating it. That is done by moving the slide-wire by hand to various temperatures on the regular instrument scales and

(*Continued on page* 130)

VICTOR DISTRIBUTION INSULATORS

NOW EVEN BETTER WITH PURIFIED PORCELAIN!

NO. 304
GUY STRAIN

NO. 5 LOW-VOLTAGE
PINTYPE

Spools, guy strains, pintypes, suspensions—all are made of the same new *PURIFIED* PORCELAIN as VICTOR's high voltage transmission types. This means that every VICTOR insulator is a better insulator—with highest insulation values, unequalled density, rock-like strength, hardness and resistance to impact, and a product uniformity never before achieved!

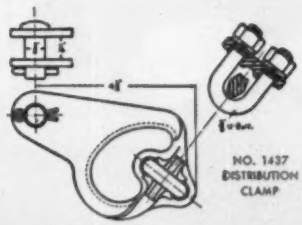
Through years of research, VICTOR has eliminated the last big variable in porcelain-making by removing all mineral salts from water used in processing. Results are reduced fluctuations in shrinkage and density and virtual elimination of microscopic, glass-like impurities which, up to now, have prevented maximum insulator strength and hardness. Remember—VICTOR *PURIFIED* PORCELAIN is the finest insulator porcelain ever made!

NO. 2012 SPOOL

NO. 804 SUSPENSION

VICTOR INSULATORS, INC.
VICTOR, N. Y.

VICTOR INSULATORS



NO. 1437
DISTRIBUTION
CLAMP

DISTRIBUTION LINE HARDWARE

VICTOR carries a complete line of distribution clamps in all required types and materials to accommodate cable sizes from 0.145 to 0.60 inches. Snubbing, quadrant or boltless types in forged steel, malleable iron or pressed steel with or without aluminum liners, according to type and size of cable to be accommodated.

Facts from
MONTANA

"'CSP' Transformers cut failures 50 to 1"

"We have been using 'CSP' Transformers for the past ten years," says a Montana Utility. "One of our divisions now has about 1,000 'CSP' Transformers in service, and an equal number of the conventional type.

"Of all our 'CSP' transformers, we have lost but one from lightning. During this 10-year period, we have been losing an average of five conventional transformers per year. That means a ratio of approximately 50 to 1 in favor of the 'CSP'."

Old standards for judging transformers were discarded when the "CSP" (Completely Self-Protecting) Transformer was introduced. The "CSP" transformer, with both lightning and thermal protection built in, has slashed costs, cut maintenance, and improved service continuity. Its reputation has been won by performance in the field, in instances like this one—records that have made it first choice with utilities coast to coast.

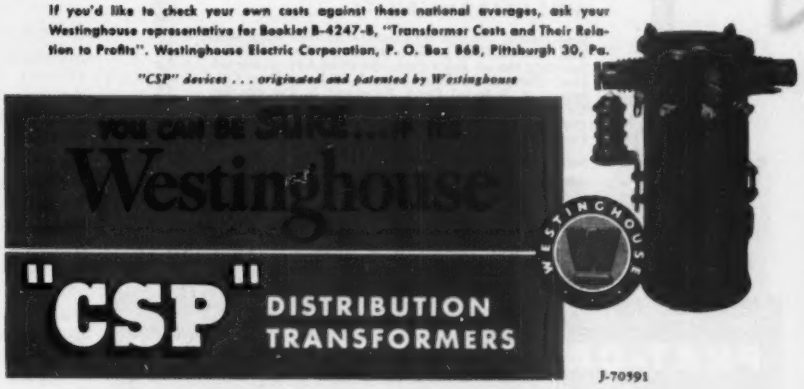
Installation and maintenance costs for Westinghouse "CSP" Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies shows the following:

NATIONAL AVERAGES

	"CSP"	Conventional
Installation Costs	$13.87	$24.74
Burn-out Rate	0.257%	1.005%
Fuse Outages	None	5.64% @ $6.52 per outage
Load Checks	Automatic	12.8%
Breaker Reset	1.02%	None

If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet B-4247-B, "Transformer Costs and Their Relation to Profits". Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

"CSP" devices . . . originated and patented by Westinghouse



J-70591

Single or double fan installations with automatic controls. Double operation on single furnace, or serves two. On single furnace either fan can operate up to 70 percent capacity; other fan then cuts in automatically.

TYPE 1 TYPE 1A

TYPE 2

TYPE 2A

TYPE 3

You eliminate fluctuations or losses in draft efficiency by the use of Prat-Daniel Stacks. P-D Fan Stacks coordinate the relationship of fans, breeching and stacks to provide and maintain maximum efficiency.

Thousands of P-D Fan Stacks in long operation have proved their superior reliability over induced-draft fans and stacks purchased separately. Easily applied to any installation, they provide highly efficient draft for the load conditions of your power plant.

Our project engineers provide expert assistance on any problems of draft production and control. Call them on current problems or planned installations. Write for Catalog No. 200.

UNIT RESPONSIBILITY

Prat-Daniel, through its sales and project engineers, The Thermix Corp., offer a complete complement for handling the air gas stream shown at left; 1. Forced Draft Fans, 2. Air Pre-heaters, 3. Tubular Dust Collectors, 4. Induced Draft Fans and 5. Fan Stacks. This unit responsibility, by a well-known firm, relieves the engineer of the responsibility for one of the most important functions in a steam generating plant.

Sales and Project Engineers

THE THERMIX CORPORATION

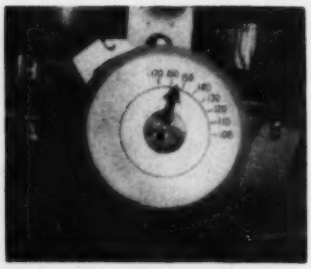
GREENWICH, CONN.

Canadian Affiliates: T. C. CHOWN, LTD.
1440 St. Catherine St., W., Montreal 25, Quebec
50 Abell St., Toronto 3, Ontario

Designers and Manufacturers

PRAT-DANIEL CORPORATION

SOUTH NORWALK, CONN.



TEMPORARY POINTER is attached to end of slide wire shaft on recorder

marking the corresponding temperatures at the end of the temporary pointer. This emergency scale must not be out of proper position when the slide-wire cover is replaced after servicing. To prevent such a condition, index marks are made on the cover and housing to assure proper replacement.

The pointer can be made and installed easily within 2 hr. Care must be exercised not to crimp the pointer more than necessary to clear the slide-wire cover, otherwise the pointer will rub the chart when the instrument case is closed.

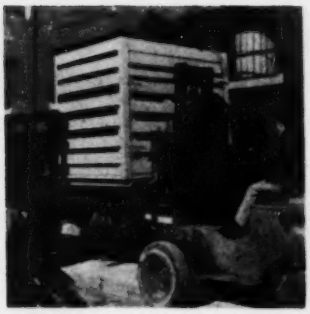
Mobile Bins Aid Storage And Loading of Scrap

W. C. STEPHEN, Asst Supervisor of Stores, Indiana & Michigan Electric Co, Ft Wayne, Ind.

Orderly storage and easy handling of scrap materials have been aided by use of mobile bins with gates. The idea was conceived by the Fort Wayne storekeeper. The bins are readily handled by a fork-lift truck used around the store room.

Formerly bare and insulated scrap copper was stored in the basement. Delivery to the metal dealer's yard entailed considerable labor in handling, rehandling and loading trucks.

Now a mobile bin is placed near the stores-receiving department where line trucks directly fill it with scrap. When filled the bin is moved to the storage yard to await disposition, and replaced by an empty bin by utilizing the fork-lift truck. This vehicle is also used to transfer loaded bins to trucks carrying the scrap to metal dealers. By opening the gate of a loaded bin, it can be readily emptied. If desired the unloading can be expedited by using an inclined floor in



MOBILE BIN filled with scrap metal is handled by fork-lift truck

the bin so contents can easily slide out.

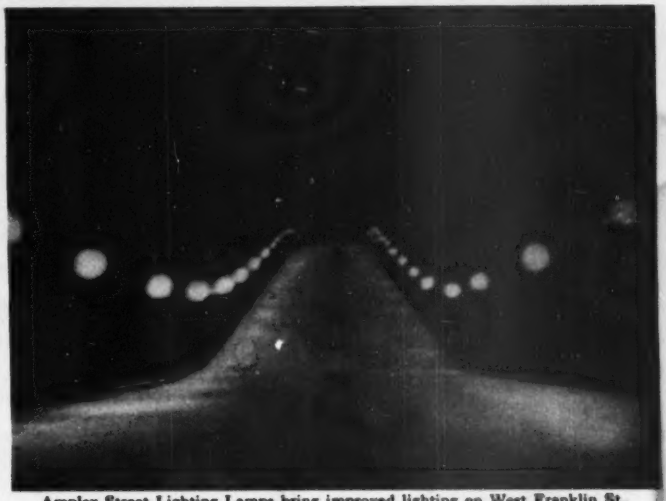
The bins were constructed by the building-service department. For wire scrap the bin dimensions are 5x6x5 ft (high) and for scrap iron 4x6x3 ft (high). In both cases the bottom sills consist of three wood crossarms. Main frame is made of 3x1-½-in. steel angles along the bottom welded to 3x4-in. corner posts. The latter utilized scrap angles on hand. Lumber is 2x6-in. fir attached to the frame by carriage bolts.

Venetian Blinds Safeguard Underground Crews

Venetian blinds are being used by Consolidated Edison Co of New York, Inc, to protect its underground construction forces while working in certain manholes. The combination of color, motion, and light is expected to keep even the most absent-minded driver from driving through the job. Blinds are 12-ft high, white with black lettering, hung on orange stanchions and topped by flashing red lights. While able to withstand heavy winds, only a slight breeze sets the blinds in motion. Blinds are used on high-speed, high-density traffic streets.

For better lighting in Baltimore...

AMPLEX STREET LIGHTING LAMPS



Amplex Street Lighting Lamps bring improved lighting on West Franklin St., Baltimore. Installation made by Consolidated Gas Electric Light and Power Company of Baltimore.

IT'S THE SAME with cities and utilities the country over . . . in fast-growing numbers they're turning to Amplex Street Lighting Lamps. These lamps are designed and built for the kind of service that really pays off. They survive the constant jolts and vibration of heaviest traffic . . . maintain their high light output throughout their extra-long-burning lives.

The Amplex line gives you a street lighting lamp of the right type and wattage for every requirement. And for absolute tops in rugged dependability your one best bet is Amplex *Weatherproof Bulbs*. They're made of .noisture-resistant "hard glass" that stands up through toughest climatic conditions and cuts service costs to rock bottom.

Get full information about Amplex Street Lighting Lamps and their efficiency and economy on the job. Write Amplex Corporation, Dept. J-5, 111 Water St., Brooklyn 1, New York.

AMPLEX

Sealed-Beam Reflector Lamps, Colorbeam Lamps, Spotlites and Floodlites, Industrial Infra-Red Heat Lamps, Vibration and Rough Service Lamps, Street Lighting Lamps, Traffic Signal Lamps, Incandescent Lamps, Fluorescent Tubes, Display Accessories.

"are you taking full advantage of Penta's* superiority?"

PENTA is a clean wood preservative.

PENTA is a chemical with lasting, uniform effectiveness.

PENTA treatment costs no more.

PENTA *is a common abbreviation of the name of the chemical, PENTAchlorophenol.*

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

Write *for Dow's free booklet "Pointers on Penta."*
The Dow Chemical Company
Dept. PE-98
Midland, Michigan

Name _____ Title _____

Company _____

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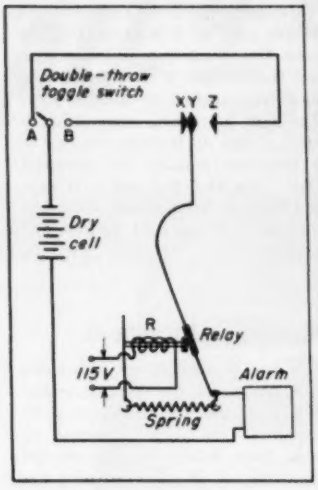
DOW
Penta
chlorophenol



EMERGENCY ALARM announces outage and restoration of main source of electric service

FARMER BERKOWITZ operates switch to silence dual-purpose alarm. Device plugs into convenience outlet. It informs him of outage and restoration of service for brooder and lights

Alarm Indicates Outage and Restoration to Brooders

WILLIAM R. KOLLMAYR, Director, Farm Service Dept, New Jersey Power & Light Co, Dover, N. J.

Notice of interruption and restoration of main electric power service to brooders and hen-house lights is provided by a dual-purpose outage alarm. The device was designed and constructed by the author to give as complete protection as possible to his company's farm customers during emergencies. Material costs are approximately $10 for the unit, which is wired in accordance with the 1951 National Electric Code.

Such an alarm has been installed by A. Berkowitz, owner and operator of the Red Rock Poultry Farm, Lambertville, N. J. It indicates when he should start or stop a standby generator. The portable alarm unit is plugged into a convenience outlet in either the kitchen or bedroom.

When the alarm sounds, the emergency generator can be started and the toggle switch put in the secondary position. A second alarm indicates that the main power supply is resumed. Then the emergency equipment may be stopped and the toggle switch can be returned to its original position.

Referring to the connection diagram, the alarm device functions as follows: When relay coil R is energized and toggle switch is in position A, relay contacts X and Y are closed. If 115-v power is interrupted, coil R becomes de-energized and relay contacts Y and Z are closed by spring action. Battery and bell circuit is completed and alarm continues to ring until operator puts toggle switch in position B. When main 115-v power service is restored, alarm again sounds until toggle is returned to position A.

KC Electrical Association Publishes Buyers' Guide

The first electrical buyers' guide for its local area has been issued by The Electric Association of Kansas City. It is designed as a source of buying information to electrical dealers, industrial purchasing agents, contractors, architects, engineers, and others who rely upon the products and services of the electrical industry in the conduct of their business. It was sent to approximately 4,000 persons in 63 counties in Missouri and 37 counties in Kansas, in addition to the 205 member firms.

Consisting of 140 pages, the guide contains a comprehensive listing of electrical appliances, specialties, apparatus, supplies, and services that are available to the industry in the Kansas City trade territory. All types of electrical products are listed by brand name. It is completely cross-referenced to enable a purchaser to locate whatever he needs, regardless of how little information he may have on the product, service or source. Tentative plans of the Association call for yearly publication of the guide.

PROUD OF THEMSELVES. Publications committee of Electric Association of Kansas City looks over new buyers' guide

They Have a Name for It—"Spectachrome"

To catch the traveler's eye, Eastman Kodak put up a huge back-lighted color film enlargement in Grand Central Station, New York. The idea has now been applied to outdoor signs. This sign, advertising Admiral refrigerators, rises 40 ft above the roof of a two-story building in Cleveland, Ohio. It is 24 ft high and 18 ft wide, and features 7-ft tomatoes, 12-ft carrots and 6-ft slices of ham in full color.

Appliance Handbook

A new 36-page teaching aids handbook that covers the selection, operation, care, and use of electric home appliances has been announced by Mrs. Julia Kiene, director of the Westinghouse Home Economics Institute. Called the Electric Home Appliances Reference Manual, the booklet tells how to select the models best suited for family needs and how to use all the new advantages the latest designs offer. Procedures are given for the care and use of appliances for efficient operation and longer life. Why a well planned wiring system is necessary to achieve the full benefits of electrical living is thoroughly explained. Copies (booklet 1CE-0204) are available at five cents each from Consumer Service, Westinghouse Electric Corp, Mansfield, Ohio.

Sylvania Electric

From Average Good to Very Good

Pretty good but spotty lighting is displaced by very good even illumination in the Bexley Pharmacy, Columbus, Ohio. These pictures typify the sales opportunities that lie in changing what is thought to be good lighting into better lighting. The "Man Who Plans" can find many places where such improvement can easily be made.

ALL 4 AGREE on NEW APPLETON V-51 SERIES

CONVERTIBLE VAPORTIGHT LIGHTING FIXTURES

Malleable Iron Fixture Body ½" or ¾" Hubs

Neoprene Rubber Ring Attachment

One of Four Reflector Styles Baked Porcelain Enamel Finish

Patent Applied For

Exclusive Unit Assembly (Receptacle—Globe—Guard)

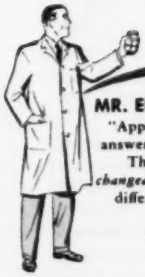
WITH MALLEABLE IRON BODIES

100 WATT OR 150-200 WATT UNITS

MR. PLANT ELECTRICIAN Says: "This V-51 Fixture is a real work-saver! Re-lamping's a cinch. One trip up the ladder to exchange Unit Assemblies and the job's done! Cleans fast, too. I attach or remove reflectors with a twist of the wrist—thanks to V-51's neoprene rubber ring attachment."

MR. PLANT OWNER Says: "Nothing beats this fixture for economical service and maintenance! My men can service it safely and quickly—*without tools!* Converts just as easily to high or low wattages. We're saving on lamps, too. V-51's shock-absorbing socket lets us use standard lamps instead of more expensive mill-type bulbs."

MR. ELECTRICAL CONTRACTOR Says: "These V-51 fixtures are tops when it comes to quick and easy wiring. The line's complete, too—gives me a pendant, ceiling or bracket type mounting for every kind of installation. Best of all, these fixtures are efficient and dependable. I know my customers are going to be satisfied with them."



MR. ELECTRICAL WHOLESALER Says: "Appleton V-51 Series Vaporlight Fixtures answer my stock-keeping problems perfectly. The line's variety—*plus complete interchangeability of parts*—means I can meet 256 different fixture requirements with only a small investment in inventory!"

Write for Bulletin 5-A

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

1703 Wellington Avenue • Chicago 13, Illinois

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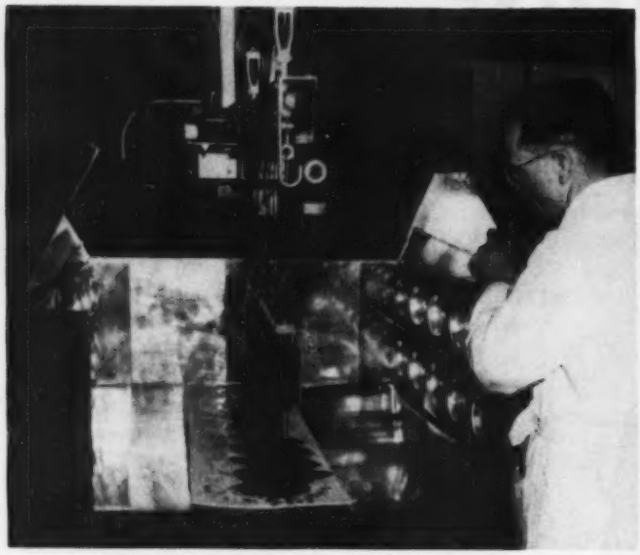
Export Field Engineers: International Standard Electric Corp., 67 Broad St., New York 4, N. Y.

APPLETON ELECTRIC PRODUCTS

INDUSTRIAL APPLICATIONS



CLOSE CONTROL of faster baking is an important advantage of infrared heat lamps for baking high-speed motor armatures. Exact temperature control is achieved by moving lamps and reflectors toward or away from oven center

Heat Lamps Bake Armatures Better

Infrared heat lamps provide a flexible, accurate, and much faster means of baking varnish on high speed motor armatures at Viber Corp of Burbank, Calif. Commercial equipment adapted for job turns out in 27½ hr armatures which required three days using a convection oven with strip heaters. Result is a more uniform product, processed under close control of time and temperature and therefore of closely predictable quality.

The lamps are mounted in conventional "ovens," with two rows of four 250-w 220-v lamps mounted behind aluminum sheet metal reflectors on opposite sides of the unit, as shown. These sides can be moved in or out to increase or decrease temperature maintained for different parts of heating cycle. Temperature of armatures is registered by thermocouple attached to one in middle of row. The other eleven armatures hang from members of a gear train which rotates them slowly during heating process.

First step of cycle is to preheat armatures at 300 F for about 45-50 min. They are then dipped in phenolic varnish, drained, and returned to the oven to be baked at 280 F for 6 hr. After cooling to 200 F, which requires about 20-25 min, they are dipped again and baked at 280 F for 21½ hr, then cooled, completing the cycle.

Unattended operation of cycle requires use of two electric timers—one for remote indication, the other for turning off lamps when heating phase of cycle is completed. A few seconds before the second operates to turn off the heat lamps, the first lights a signal lamp in another part of the plant to warn that the heating phase is over. A predetermined setting on the first timer turns out the signal lamp when the desired cooling period is over.

Detachable Reflectors Aid Maintenance

MAINTENANCE is easier and faster with these detachable fluorescent lamp reflectors

Take-down fluorescent lamp reflectors are contributing much toward simplifying luminaire maintenance at the Standard Coosa Thatcher Co Mill, Piedmont, Ala. Cleanliness is easily maintained throughout the mill and employees are well satisfied with these excellent working conditions.

Each luminaire consists of an 8-ft channel and two detachable porcelain enameled reflectors with 96-in. T-12 Slimline fluorescent lamps. Only two suspension rods are needed for each 8-ft individual unit. Average maintained illumination is 25 to 50 ft-c depending on layout of units. Ceiling and upper walls are white, lower walls aqua, and floor natural maple finish. Spacing is 11 by 16 ft, mounting height, 13 ft. W. H. Kahler, Illuminating Engineer, Westinghouse Electric Corp, Cleveland, Ohio.

INDUSTRIAL BRIEFS

Degreasing sheet metal products before painting and subsequent drying in a conveyor-type 85-kw infrared oven saved the Radiant Steel Products Co, Williamsport, Pa., over $300 a month on degreasing costs and permitted degreasing, painting, and drying at the same time on the same conveyor belt. Formerly, a gas heated vapor solvent was used for degreasing before painting and subsequent drying in a conveyor-type drying oven and the paint finish was turning out very dull and undesirable. Harry Moore, Industrial Power Engineer, Susquehanna Division, Pennsylvania Power & Light Co.

X-ray inspection of heavy steel Army tank armor castings is improved and greatly speeded by three 24-million volt betatrons at General Steel Castings Corp plants at Granite City, Ill., and Eddystone, Pa.; also at Continental Foundry & Machine Co, E. Chicago, Ind. Another installation is under way at the Continental Plant, Coraopolis, Pa. These X-ray units penetrate 7 to 9 in. of armor steel in little more than one minute. They permit positive inspection and quality control procedure and provide sharp X-ray film records through metal sections up to 24 in. thick. Former inspection techniques required hours and days in some cases. Each unit is housed in a specially designed radiation-proof building. Steel Founders' Society of America.

Chute heating with electric strip heaters has eliminated sticking of clays and clogging of chutes at the Sparta Ceramics, East Sparta, Ohio. Between 150 and 200 w per sq ft of bottom chute surface provided excellent results. Previously the wet clays, especially during spring and fall, presented many operating difficulties. G. W. Craiglow, Industrial Power Engineer, The Ohio Power Co, Canton, Ohio.

Wax softening by infrared lamp at Continental Can Co, Mifflin Borough, Pa., has solved a difficult problem of wax removal from tops of beer cans. Insides of some beer cans are coated with wax and any accumulation on their tops must be removed. K. P. Allen, Industrial Power Engineer, Duquesne Light Co, Pittsburgh, Pa.

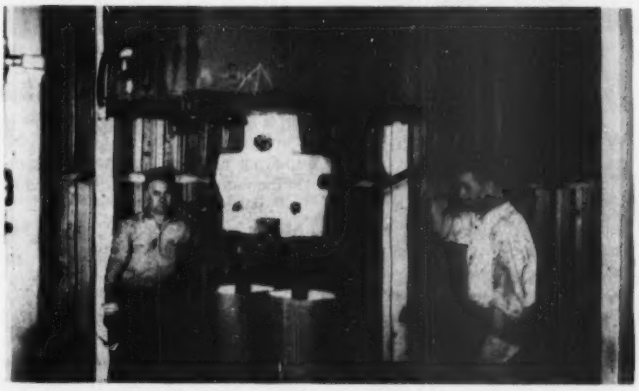
IMPROVED QUALITY and top rate saleability of sauerkraut is maintained by ultraviolet lamps. Lamp radiations prevent bacteria from attacking foam as it is formed on barrel tops

Ultraviolet Lamps Aid Sauerkraut Aging

L. ALBERTSON, Application Engineer, Philadelphia Electric Co

Sauerkraut aging is aided by 14 18-w ultraviolet lamps at P. Herold & Sons, Philadelphia, Pa. Lamps protect sauerkraut from mold during aging process. Each barrel in the two fermenting and curing rooms is protected by the lamps from microscopic organisms which otherwise would develop and cause kraut to take on a pink hue—reducing quality and top-rate salability. Large weights placed on barrel tops to press out air pockets and fermentation gases (resulting in a foam) increase effectiveness of the ultraviolet. Lamp radiations prevent bacteria from attacking foam.

Strip Heaters Provide Accurate Heat



Wax melting is accurately and safely controlled at H. H. Robertson Co, Ambridge, Pa., by 126-kw strip heaters clamped to outside of 600-gal kettle. Additional 10 kw of strip heaters on draw-cocks and release valves of tank assure easy flow of wax compound into containers. Kettle heaters are connected to provide three horizontal zones of control which permits economical operation. E. M. Wenner, Duquesne Light Co, Pittsburgh, Pa.

NEW EQUIPMENT

Lighter-Weight Distribution Transformers

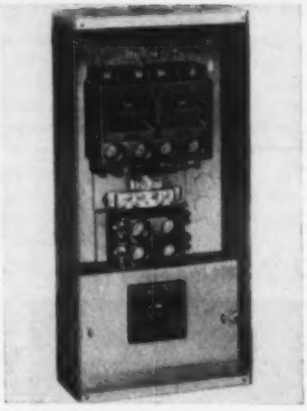
The fourth weight reduction in distribution transformers of the pole type has been announced recently by General Electric.

A new design of these units reduces the overall weight about 10%, the company reports. This reduction saves on critical materials and also makes pole mounting easier, thus saving installation time.

The improvements in core steel and processing methods and also a reduction in the amount of copper needed for the units makes it possible to build seven transformers with the same amount of metal as was formerly required by six transformers.

In addition to stronger construction, it is reported that lower impedances and improved regulation are offered. Clamping structures and coil supports have been simplified, and this is said to reduce the short circuit strength materially.

These news units are available in ratings of 50 kva and less. Other ratings will be added as soon as possible. **General Electric Co, Schenectady 5, N. Y.**



Waterheater Service Equipment

Square D has developed a new addition to its line of 100-amp fusible service equipment as an economical answer for equipment necessary to isolate special low rate water heater loads. This device provides a sealable barrier under the standard trim and prohibits any change or unauthorized circuits being added to the low rate loads.

They are furnished with parallel range and main pullouts for 3-wire, 220-v circuits and either 4, 6 or 8 plug fuse, 2-wire, 110-v circuits.

For the conventional application, the independent circuit may be rewired into the 60-amp bus tap and the barrier omitted. Others are equipped with a 100-amp main pullout which controls range, waterheater and up to 16 plug fuse circuits.

Square D Co, 6060 Rivard St, Detroit 11, Mich.

Resistor and Fuse

The "Fusistor" is a resistance unit that under normal electrical load will operate as a resistor only, but when subjected to overload acts as a time-lag fuse and will interrupt the circuit.

It can be built to carry an overload for a minimum of 20 sec, then fuse or burn out within the next 30 sec. No spewing of flame, or spark emission, at the moment of fusion is claimed by the manufacturer.

Milwaukee Resistor Co, 700 W. Virginia St, Milwaukee 4, Wisc.

Hot Line Clamp

This new tap clamp is designed to protect the connection. It reportedly not only has thread protection but conductor and contact protection. Threads are enclosed in a corrosion-proof lubriplate housing to prevent freezing on the line. Threads and eye screw shaft are further protected from

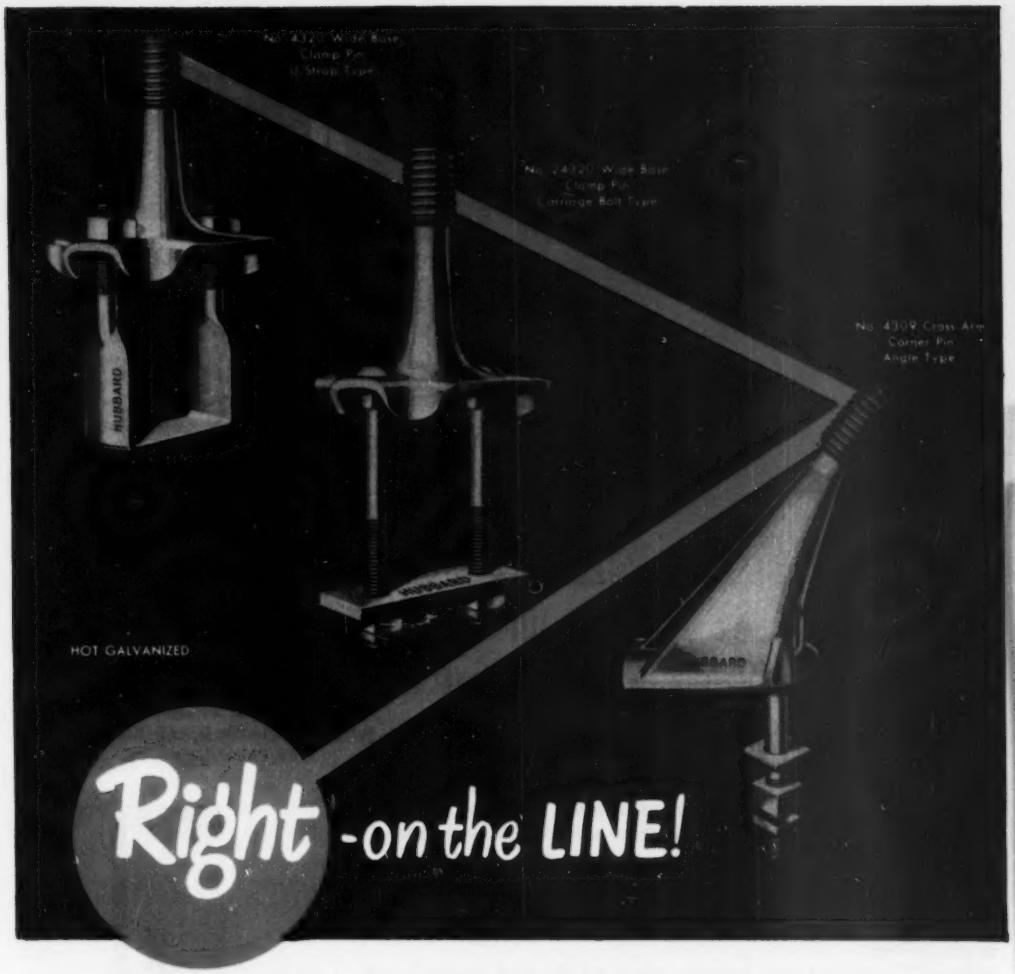
arcing by a recess for the shaft which keeps it out of the arc zone.

The unique design of the clamp balances the jumper connection with the eye screw reducing conductor fatigue, thus increasing conductor life. Bell-shaped jaws prevent sharp bending of the conductor and further increase conductor life.

Another feature of the clamp is a shielded spring which compensates for conductor flow and prevents line vibration from shaking the clamp loose from the line.

Called the protected connection clamp, it is made in a complete range of sizes.

A. B. Chance Co, Centralia, Mo.


No. 4320 Wide Base Clamp Pin U-Strap Type
No. 24320 Wide Base Clamp Pin Carriage Bolt Type
No. 4309 Cross Arm Corner Pin Angle Type
HUBBARD
HOT GALVANIZED
Right -on the LINE!

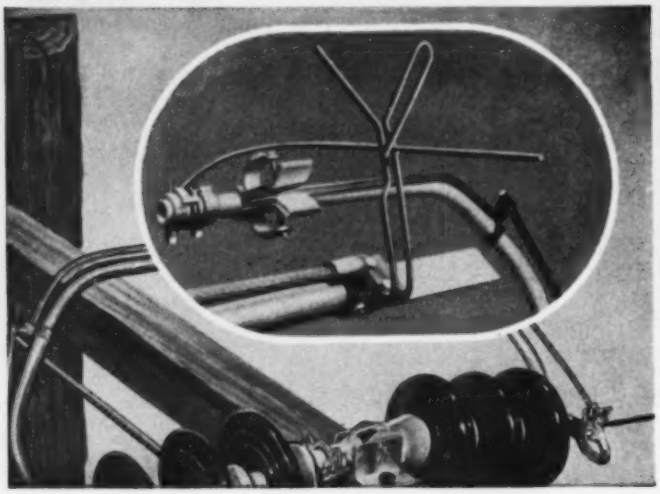
whether it's straight line or corner construction . . .
***it calls for* HUBBARD INSULATOR PINS**

Hubbard Wide Base Clamp Pins, Nos. 24320 and 4320 for angle or corner construction, are forged from new hot-rolled open-hearth steel. The broad bases of these pins present a large area to the arm, reducing "burning" and cutting into the wood to a minimum. The four lugs prevent the pin from turning on the arm. They are available in Carriage Bolt and U-Strap types as illustrated. Carriage Bolts and Plate are included with the No. 24320 style.

Hubbard Angle Type Cross Arm Corner Pins, No. 4309 style, are made from certified malleable iron for use on 4 by 5-inch cross arms. The back of the pin (the portion farthest from the bolt) is placed to the inside of the angle of the line, providing a leverage which offers maximum resistance to corner loading. They come with 1 and 1⅜-inch lead threads and for 1⅜-inch thimbles. Mounting Bolt, ⅝ by 6-inch, with washer, nut and lock nut is included.

HUBBARD AND COMPANY
ESTABLISHED 1843
PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA
"Hang the load on Hubbard Hardware!"

KPF POLE TOP SWITCHES



Drop 40 miles of 69 kv lines with KPF Quick-Break pole top switch

Operating engineers tell us KPF switches with Quick-Break attachment are the most outstanding air-break switch improvement in 25 years. Before development of this Quick-Break device, pole top switching of 69 kv circuits was limited to some 6 miles of line. Now, operating experience shows that 40 miles of 69 kv line can safely be dropped with this equipment.

The secret of the KPF Quick-Break is a heavy-duty cat's whisker which whips free in a split second as the switch is opened. This mechanism prevents establishment of an arc; thus critical arc length is no problem.

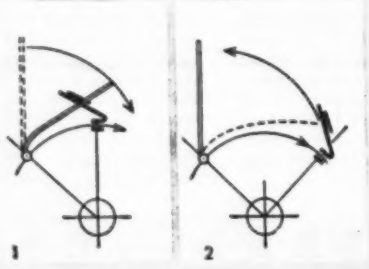
The KPF Quick-Break attachment is simply and ruggedly constructed for low cost, long life and all-weather dependability. It is available for all KPF switches rated 15 to 69 kv.

HERE'S HOW KPF QUICK-BREAK WORKS

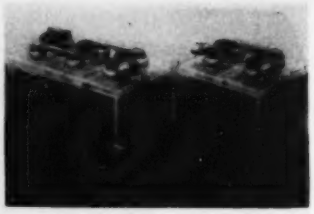
1. Spring rod winds to full tension as switch opens.

2. Rod springs clear, breaking contact at high speed.

Write for details of KPF Quick-Break attachment and low cost, long-lasting, easy-to-install KPF Switches.



KPF ELECTRIC COMPANY
1624 E. Alpine Avenue • Stockton, California



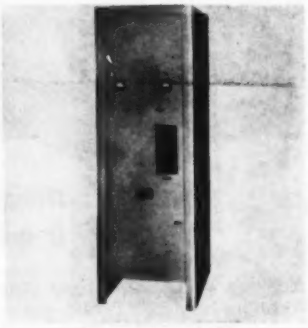
Storage Batteries

A series of storage batteries of two-cell and three-cell construction for stationary applications offers distinct advantages in space and weight saving. Maintenance reduction and improved dependability are also reported.

Designated Exide type PLX, batteries are in transparent polystyrene plastic cases that show at a glance the level of the electrolyte and the approximate state of charge.

An improved safety factor is achieved by an automatic venting device of clear polystyrene built into each cell to prevent excessive gas accumulation. The new series is recommended for electric switchgear, emergency lighting and power, etc. Batteries are rated at 50 or 100 amp hour capacity at the eight hour rate.

The Electric Storage Battery Co, Box 8109, Philadelphia 1, Pa.



Battery Charger

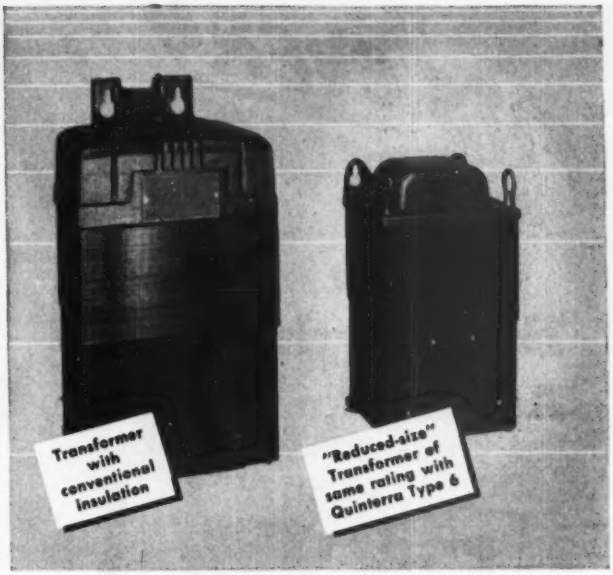
This line of heavy-duty, high-capacity regulated battery chargers utilizes selenium rectifiers with magnetic amplifier controls to safeguard and extend the life of the batteries. It also provides low cost automatic operation. Units are available in sizes from 25 through 1200 amp and voltage ratings to 60-v dc.

Extremely fine regulation to better than plus or minus 0.5% from no load

Weight reductions average 30%

in new line of transformers employing

*Quinterra** TYPE 6



Another example of savings permitted by this Johns-Manville purified asbestos insulation

A NEW LINE of dry type transformers announced by a prominent electrical manufacturer achieves savings in weight up to 50% in some models . . . 30% on the average. Contributing to these savings is the use of Quinterra Type 6 as layer insulation between the high and low voltage windings.†

Other manufacturers also report that Quinterra Type 6 permits substantial material savings. In addition, they state that this flexible insulation raises overload limits, increases safety, minimizes rejects, lengthens equipment service life, and lowers production costs.

Quinterra Type 6 possesses high thermal stability and lasting dielectric strength. It is a twin-ply, polyvinyl acetate treated purified asbestos insulation with a dielectric strength of 300 VPM. Even when its saturant is baked out by continuous exposure to 200 C, it retains the inherent dielectric of the base sheet which is at least 200 VPM . . . and it remains a dielectric up to 400 C.

Type 6 is the strongest Quinterra because it is made by combining and calendering two layers together into a dense, smooth surfaced insulation. Its good tensile and bursting strengths enable operators to achieve favorable production rates. Further economies result from its large square-foot-per-dollar coverage.

If you are a manufacturer of magnetic or resistance devices, Quinterra Type 6 may enable you to obtain substantial cost reductions. For samples and additional information, write Johns-Manville, Box 60, New York 16, N.Y.

†Quinorgobord #1100, another J-M purified asbestos insulation, is also used as end filler strips.

*Quinterra is the registered trade mark of Johns-Manville's purified asbestos electrical insulation.

JOHNS MANVILLE JM PRODUCTS **Johns-Manville ELECTRICAL INSULATIONS**

FITS EVERY LINEMAN!

NEW

Buckingham Adjustable Climbers

Now—one pair of climbers that fits tall men, short men—all men on the crew! One pair of climbers that accommodates the various thicknesses of footgear and clothing worn in different seasons!

New Buckingham Adjustable Climbers are quickly and easily adjusted from size 15" to size 18" by means of an oval head set screw and lock washer, assuring exact fit. If desired, leg irons can still be bent to follow the shape of the wearer's leg.

These advanced-design climbers permit utilities to carry a smaller stock of climbers. They are eminently practical as extra climbers. And—because they will fit any worker—they're ideal for sub-station, plant or service truck.

Famous Buckingham Quality, Safety, Comfort

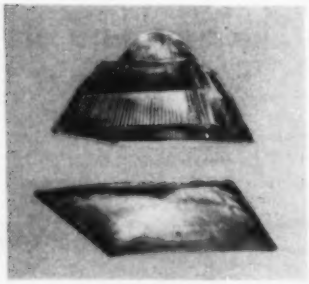
Buckingham Adjustable Climbers can readily be fitted with leg and foot straps, and deluxe leather pads filled with rubberized wool for greater comfort. Gaffs are permanently attached to the leg irons, pitched at an angle which permits closer standing to the work—less chance of cut-out—easier climbing.

Standardize on Buckingham Adjustables. Fewer pairs are needed to keep every man working.

Ask about them at your supply house — or write for further information.

BUCKINGHAM MANUFACTURING CO., INC.
1-3 TRAVIS AVENUE BINGHAMTON, N. Y.

to full load with up to plus or minus 10% ac line variation is claimed. An automatic current limiting feature prevents overloading. Response time under extreme load changes is reportedly very fast.
INET, Inc, 8655 S. Main St, Los Angeles 3, Calif.



Low Brightness Luminaire

Holophane's latest development, a low brightness recessed luminaire with increased efficiency, is said to introduce a new concept in incandescent lighting.

The unit features a larger lighting unit with a larger lens and a narrower trim. The unique "optical train" consists of a square prismatic reflector and a concave controlens. Cooperating with the lens and completing the optical combination is a square reflector with a dome-shaped top section containing a side entrance for the lamp.
Holophane Co, Inc, 342 Madison Ave, New York 17, N. Y.

Strain Clamps

Pinco has introduced three new strain clamps designed especially for use with either ACSR or all aluminum conductors.

The 4550 clamp will take all alu-

all this adds up to

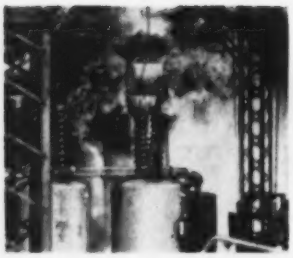
LOWER MAINTENANCE COST

for you

The finest in engineering and manufacturing "know how" is in back of every KNOX Electrical Porcelain Insulator. Take for example the KNOX Suspension Insulator illustrated above ... compare it feature for feature with any other and you will find the reason why KNOX represents the finest in electrical porcelain insulators. Write for catalog showing the complete KNOX line.

KNOX PORCELAIN CORPORATION

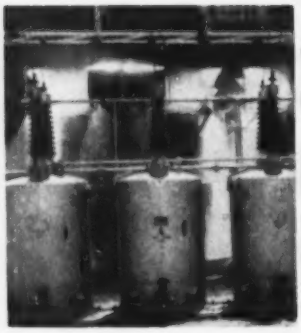
KNOXVILLE 1, TENNESSEE



PROTECTING

flammable, oil-filled

TRANSFORMERS



with time-tested, rapid extinguishing

GRINNELL MULSIFYRE

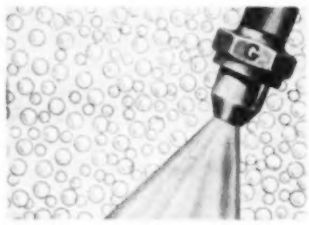
In case after case, where Grinnell MULSIFYRE has been on guard, hazardous oil fires have been effectively controlled — damage limited. For example . . .

● On August 2, 1944, a fault occurred on the 26 KV ring bus at a substation of the Public Service Electric & Gas Co., Harrison, New Jersey. Following the tripout, the operator noticed the end bay, where the transformer was located, to be ablaze. He immediately activated the electrical control operating the Grinnell MULSIFYRE System, deluging the transformer banks with water spray and extinguishing the fire.

● At a substation of the Omaha Public Power District, Omaha, Nebraska, two 25-year-old three phase 6250 KVA 13.2-2.3 KV water-cooled indoor type transformers were protected by a MULSIFYRE System automatically actuated by Quartzoid Pilot Sprinklers. On August 30, 1944 a minor explosion occurred, setting the transformer afire. The Grinnell MULSIFYRE System went into operation immediately, and there was no fire damage.

● In 1948, a lightly built wooden sawing shed was erected by the Singer Manufacturing Company, Bridgeport, Connecticut, adjacent to a bank of three 500 KVA transformers. A fire started in the shed, apparently when a carelessly discarded cigarette or match ignited sawdust, and quickly burned through the roof. The MULSIFYRE System operated over the exposed transformers, preventing damage to them.

Stop future trouble and expense. Get complete facts *now* on reliable Grinnell emulsion-forming spray systems. Write Grinnell Company, Inc., Providence, R. I. Branch offices in principal cities.



GRINNELL *Mulsifyre*

EMULSION-EXTINGUISHMENT OF OIL FIRES

minum conductors and ACSR from .2 to .55, including No. 4 through No. 1/0 ACSR or all aluminum. The 4468 is recommended for use with 2/0 through 4/0 ACSR or all aluminum conductors from .2 to .68. The 4485 is recommended for use on 226,800 cm, 300,000 cm and 336,400 cm ACSR or all aluminum.

Installations on lines reportedly show these clamps are easy to blanket when working lines "hot." They also provide excellent snubbing action without damage to conductors. The quadrant type design allows continuous "running" of conductor thereby eliminating the necessity of cutting the conductor at strain points to make "jumper" loops.

The Porcelain Insulator Corp, Lima, N. Y.

Portable Lighting Fixture

This portable spot or flood light fixture, reportedly involves no installation expense and is designed for use in any porcelain ceiling receptacle and with swiveling devices. Known as the Silver-spot Adapter, it is suitable to a wide variety of display and accent lighting uses in stores, restaurants, etc.

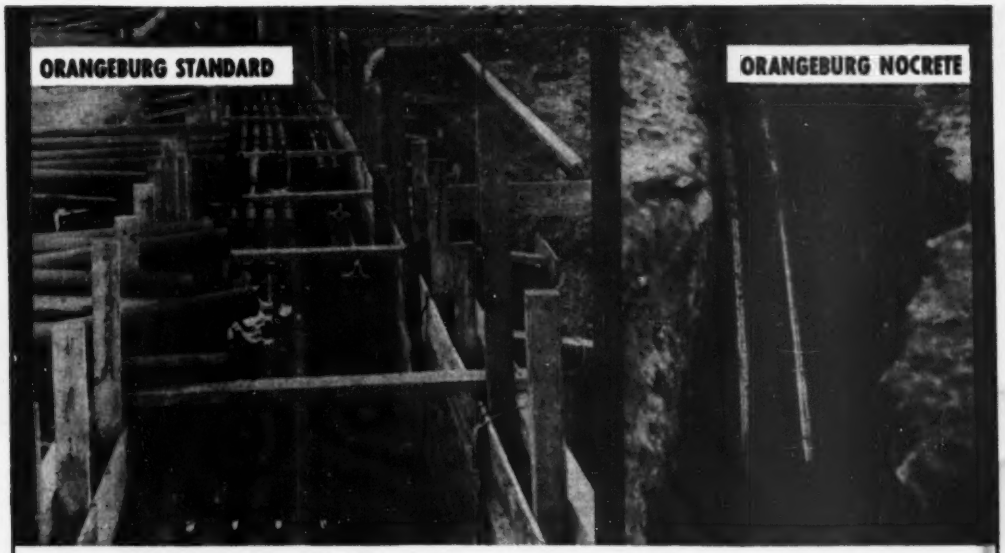
Compact in size, it has an overall height of 5⅜-in., and provides complete shielding of the light source, 45° shielding of the reflector, and low brightness on the louver.

Silvray Lighting, Inc, 100 W. Main St, Bound Brook, N. J.

Fluorescent Mercury Lamp

The 1,000-w, C-H12 fluorescent mercury lamp has been made available by Westinghouse. This light source provides a golden white light for all

(*Continued on page* 148)



ORANGEBURG *Fibre* CONDUIT

STANDARD *installed with Concrete* · **NOCRETE** *installed without Concrete*

During the past 58 years—an era of great expansion for the Electrical Industry—Orangeburg Conduit has provided constant protection for the vital cables through which utility companies supply the life fluid of modern illumination, heat and power for modern homes, offices, factories and farms.

This record of 58 years underground pays tribute to the uniquely tough, strong, resistant materials of which Orangeburg Conduit is made . . . and their capacity to withstand corrosive ground waters and chemical wastes permanently.

Also important to utility companies is the fact that Orangeburg Conduit is easy to handle, transport, install . . . low in initial costs.

For more complete information write today to Dept. EW-51 for Orangeburg Catalog No. 51. Keep it ready for reference in your files.

Orangeburg Manufacturing Co., Inc., Orangeburg, New York

TIME-TESTED ADVANTAGES

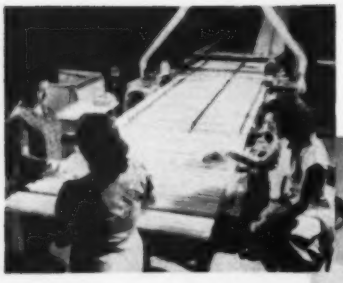
- Impermeable wall and tight joints prevent corrosive ground waters from entering
- Lays faster and at lower cost than any other type of conduit
- Low coefficient of friction minimizes pulling tensions on cables. Protects cable sheath from abrasion when pulled in — also from wear during cable movement resulting from alternate expansion and contraction with changing loads
- Resists acids, alkalis, grease, oil
- Light, easy to handle and tool on the job
- Tough, resilient — will not crack or break when properly handled

GENERAL ELECTRIC SUPPLY CORPORATION

DISTRIBUTORS, ORANGEBURG FIBRE CONDUIT

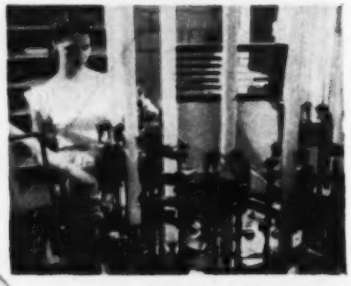
GraybaR ELECTRIC COMPANY

BRANCHES AND STOCKS IN PRINCIPAL CITIES



This tremendous sphere measures light output. This exacting test is only one of the 247 tests imposed on Westinghouse fluorescent lamps to insure maximum lighting economy.

In this all-important step, skilled workers check the coating of Westinghouse fluorescent lamps to see that it is perfectly uniform and free of flaws.



Here the electrode is carefully sealed into the lamp prior to the air-exhaustion and injection of the krypton-argon starting gas.

Lamp Division
Westinghouse Electric Corporation
Bloomfield, New Jersey

YOU CAN BE **SURE**... IF IT'S

Westinghouse

more light, more savings

Real savings are made possible with this new Westinghouse 90-watt fluorescent lamp, and here's why . . .

This new lamp gives 6% more light than the 85-watt fluorescent lamp, yet uses only 2% more current. What's more, its high light output is consistent, for even after 7500 hours of operation it still out-produces any other lamp in its class.

In short, there's top lighting value from this new economy-size fluorescent tube! For any industry or business looking for better lighting at lower cost, this is the tube to use.

WESTINGHOUSE LAMP DIVISION Dept. AW
BLOOMFIELD, NEW JERSEY

I'd like to know more about the new 90-watt Westinghouse Fluorescent Lamp.

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

NEWS FROM WESTINGHOUSE, THE FASTEST-GROWING LAMP MANUFACTURER

by Sam Hibben

DID YOU KNOW?

Many deep sea fish have built-in fluorescent lights, but one of them has a twist: The sub-order Ceratioidea has its fluorescent lamp on the end of a pole! Smaller fish go after this luminous bait, and wham—they get eaten. The trick, I suppose, is how to keep big fish from going after the bait—but big ones seldom go that deep, and many lighted-up fish can dim out at will.

Fish, incidentally, have—like onions, cabbage or dozens of other foods—wholesome but penetrating odors when cooked. Westinghouse has just introduced a tiny lamp that destroys odors—it really does. The lamp puts out rays that create ozone, and the ozone oxidizes the floating molecules of most common odors. It's easier to operate than explain, but it costs only about 5¢ a week to burn and it keeps air fresh and sweet.

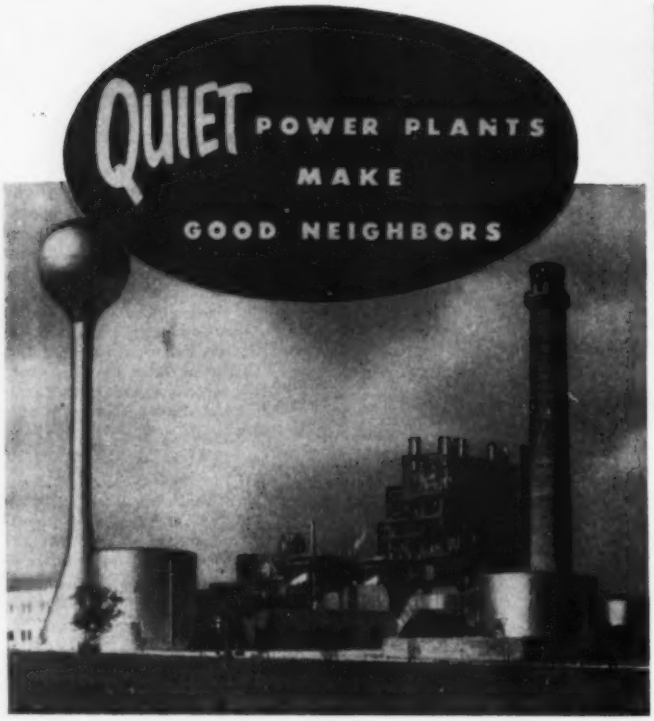
A THOUGHT FOR THE DAY:

Your eye lenses act much like a camera's. This means that the image on your retina is upside down. That is, the top of a tree registers on the bottom of the eyeball. You've simply learned to interpret it around again after the electric impulses have carried the "television" picture to the brain. Had you known you were that smart, or does the world still look upside down?

More next month.

Samuel G. Hibben

WESTINGHOUSE FLUORESCENT LAMPS STILL COST LESS THAN THEY DID IN 1940, YET BURN SEVEN TIMES LONGER!



● Progressive power companies like the Florida Power and Light Company, whose Cutler Steam Electric Station is shown above, are silencing their operations with INDUSTRIAL SOUND CONTROL installations—and, in so doing, are insuring their precious public relations. ISC, through its specialized research and experience, effectively and economically suppresses noise in industrial operations.

ROAR *. . . of induced draft or forced draft fans can annoy residents over a wide radius.*

HUM *. . . of a transformer in a quiet residential neighborhood can be a nuisance at an amazing distance on a quiet night.*

CRASH *. . . of machinery can seriously affect employees, accelerating fatigue, slowing reflexes, and building up nervous tension — all accident breeders. Hearing may be permanently impaired, resulting in accidents and costly damage suits.*

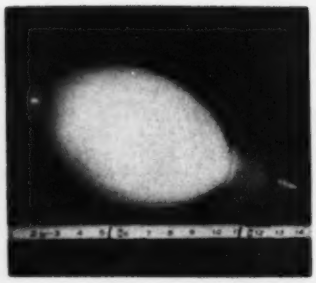
INDUSTRIAL SOUND CONTROL, INC., was the originator of industrial soundproofing. Its installations, completely engineered to solve the individual noise problem, range from test cells for testing the most powerful jet engines to soundproofing a small compressor.

Don't wait until you are threatened with legal action—Call on ISC first. Write today for full information.

Midwestern distributor:
Midwest Industrial Sound Control, Inc.
1455 North Pennsylvania Street,
Indianapolis 2, Indiana

Industrial Sound Control Inc.

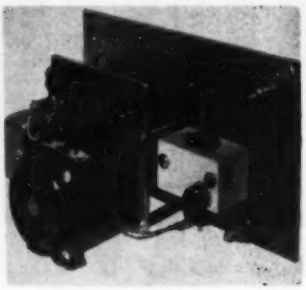
45 GRANBY STREET, HARTFORD, CONN.
2119 SO. SEPULVEDA BLVD., LOS ANGELES, CALIF.



types of lighting service except where close color discrimination is involved.

Inside frosting of the bulb provides better diffusion of light and greater uniformity of color. When used outdoors, fixtures should be designed to protect bulb from a driving rain or moisture-laden insects.

Westinghouse Electric Corp, Lamp Division, Bloomfield, N. J.



Electronic Servo Mechanism

The Atcotran electronic servo employs an electrical null balanced differential transformer measuring system actuated by a two-phase low inertia motor.

It has a full range rotation in 2, 4 or 10 secs, instantaneous output shaft movement per change and dead beat non-cyclic response.

Automatic Temperature Control Co, Inc., 5200 Pulaski Ave, Philadelphia 44, Pa.

Portable Extinguisher

This pressure-operated, dry chemical portable fire extinguisher answers the need for a rechargeable field unit.

Portable unit permits it to be serviced following discharge by pouring 5 lbs of dry chemical into the powder

At the World's Largest Slag Plant — owned and operated by Birmingham Slag Company, Birmingham, Alabama.

AUTOMATIC CONTROL

Does What Human Hands Couldn't Do

●

Production schedule, averaging one trip per minute, now easily maintained.

New EC&M FREQUENCY RELAY Controller slows bucket by plugging to prevent overtravel and derailment of cars. Power occasionally re-applied as trip ends.

Previously, manual jogging by skilled operator could not always avert delays, even though down-car was aided by engaging counterweights to offset over-hauling effect of car going over the knuckle at the top.

THE PROBLEM:

How to govern speed *from the ground level* as the loaded bucket reaches the top, levels out and quickly tips to dump. The motor load, a maximum driving value on the upgrade, falls off as the bucket levels out, and changes quickly to maximum *overhauling* as the bucket jackknifes to dump. An operator has little time to "feel" or judge the motor load under such swift or sudden changes.

THE SOLUTION:

EC&M Frequency Relays respond accurately to the slip-frequency of the wound-rotor hoist motor. As a loaded bucket reaches the top, plugging is automatically applied by the limit switch and the bucket reaches the end of travel with motor speed reduced to 17% or less. An empty bucket going over the knuckle operates in like manner. With a *heavily loaded* bucket, power may be re-applied after plugging but the motor seldom speeds up to a point where a second "plug" is required before the trip is ended. EC&M Frequency Relays provide a simple, accurate method of controlling plugging and accelerating contactors for smooth operation of the a-c skip hoist.

Contacts Lasted 3 Months— No Replacement Now in Over 2 Years

Previously, frequent jogging handling heavy currents accelerated contact wear. Since converting to automatic operation by Frequency Relays, movements are a minimum and examination after 2 years indicates no replacement will be needed for some time.

Write for your copy of EC&M Frequency Relay Controller Bulletin 9304-SX.

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET • CLEVELAND 4, OHIO

THE MARK OF MARCUS MTC QUALITY

...guard. The combination of a ... product with genuine interest in the customers' side of the transaction has necessitated the completion of our third and largest expansion move within the past 5 years. What better recognition of the *"Mark of Quality"!*

•

Representatives in Principal Cities

General purpose transformers, 600 volts and below; 1-15 KVA inclusive, single or three phase.

450 KVA, Type F Unit Substation, 4160 V. Delta, 60 Cycles, 3 Ø— 120/208Y, 4 wire.

PIONEERS IN THE FIELD OF AIR COOLED TRANSFORMERS

MARCUS DRY TYPE transformers

NEMA

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DRY TYPE TRANSFORMERS EXCLUSIVELY.

1 to 2,000 KVA up to 15,000 Volts to meet Individual Requirements

• DISTRIBUTION • GENERAL PURPOSE • UNIT SUBSTATION • PHASE CHANGING • ELECTRIC FURNACE • RECTIFIER • WELDING • MOTOR STARTING • SPECIAL

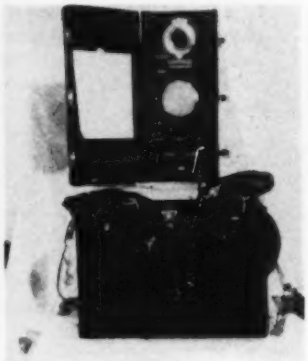
MARCUS TRANSFORMER CO., Inc.

...MONTGOMERY RD. • ...ELLING 5, NEW JERSEY

chamber and charging it with 150 lbs of compressed air.

Unit weighs ten pounds when loaded, stands 15-in. high, and is 4½-in. in diameter.

Walter Kidde and Co, 40 E. 34 St, New York 16, N. Y.



Fault Locator

The Echo fault locator is a device especially designed for measuring the distance to a fault on an open wire circuit. The fault may consist of an open, partially open, short circuit, ground or partial ground.

It is applicable on telephone lines and double circuit power lines. It is accurate within 2% on overhead lines —usually within one or two pole spans.

The principle used is that a pulse of very short time duration is applied to the wire under test and the time measured that the pulse takes to travel to the fault and return.

The pulses sent along the line are transmitted to an oscilloscope where distances can be evaluated.

Echo Electronics Co, 3966 Peachtree-Dunwoody Rd, Atlanta 5, Ga.

MORE NEW PRODUCTS
about which you should know

Westinghouse Electric Corp, Pittsburgh 30, Pa., announces an **electronic air cleaner** for keeping residences free of dust and dirt, as well as cool.

General Electric Co, Schenectady 5, N. Y., announces a new **mercury lamp.** It is reportedly a highly efficient 1000-w mercury lamp for general industrial use. Life rating is 3000 hrs at 5 burning hours per start and 4000 hrs at 10 burning hours per start. . . . The Permutit Co, New York, N. Y., has developed two highly **basic anion exchanger resins.** They are capable of removing silica from water in the ion exchange demineralizing process.

General Electric Co, Schenectady 5, N. Y., has developed an **improved askarel** for power transformers, load centers and capacitors. The new liquid has lower viscosity at lower temperatures and a lower pour point. . . . Benjamin Electric Mfg Co, Des Plaines, Ill., announces a new **gridlite lighting system** utilizing a unique grid-like arrangement of prewired channels, single-pin T12 Slimline lamps and translucent shields.

Borden Engineering Co, New Providence, N. J., has developed a new **ground resistance tester** called the groundometer. Instrument is designed to fill a need for a low cost, light weight resistance tester. . . . J. T. Henry Mfg Co, Hamden, Conn., has developed an insulated **giant power shear.** Its wide use in line clearance and tree pruning makes the insulated model of great value in this type of work.

Westinghouse Electric Corp, Pittsburgh 30, Pa., recently developed a **magnetic amplifier system** to control a cold reduction mill. The Magamps will furnish excitation and regulate accurately the voltage of the generators supplying the mill and other motors. . . . United States Safety Service Co 1215 McGee, Kansas City 6, Mo., offers a new **acid safety goggle,** named Duo-Chem. It features a bright yellow vinyl frame. Light weight and genuine comfort are also claimed. Full protection from all chemical splashes and dusts is claimed.

"No Use Going Out There
...*THEY BURNED OUT LAST NIGHT!*"

THAT'S BAD NEWS today when electrical equipment is so hard to replace. Bad news for management, too—especially if it has to explain why the fire protection it provided was too little or the wrong kind!

Too many utility fires result from failure to be ready for fire. In generators, transformers, switching equipment and other danger spots fire can hit like lightning, with crippling effect. Ordinary precautions and protection are often hopelessly inadequate!

When CARDOX originated "Low Pressure Carbon Dioxide Systems"* years ago the very first system went into a central station. Since then CARDOX Systems have been recognized as standard, required protection by many utility companies. Applying CARDOX CO_2 in any quantity, they hold fire damage to a minimum—and eliminate extinguishment damage entirely!

Your operations will be safer with* CARDOX *protection. **A survey by CARDOX will show you how easily you can write off fire as a major threat. We'll arrange one if you'll kindly write us.**

*Covered by Patents Issued & Pending

CARDOX
ORIGINATOR OF **Low Pressure CO_2**
FIRE EXTINGUISHING SYSTEMS

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS
Offices in Principal Cities

The Old Reliable

EVERSTICK ANCHORS...

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life

● **They speed up work and provide dependable anchorage in new construction and maintenance. Quick and easy to install—made of tough rust-resistant malleable iron—their holding power "tops" all others. Available two-way, three-way, four-way, and cone types. Write for facts.**

AN EXCLUSIVE
EVERSTICK
FEATURE
Exclusive Everstick nut housing. Locks anchor firmly on rod. No chance of rod slipping thru anchor.

EVERSTICK ANCHOR CO.
Manufacturer of "THE ANCHOR OF MERIT"
FAIRFIELD, IOWA

WHAT THEY'RE SAYING
At Industry Meetings

National Standardization

W. R. McCAFFREY, general manager, Canadian Standards Association before the Canadian Manufacturers Association at Ontario

There are two main types of standardization, one that is carried on by producer-consumer cooperation to develop unified standards and the other carried on by industry. Both of these practices result in savings in material and labor with a consequent saving of produced articles.

If you do not have standardization your costs are higher and the result is your customers pay higher prices, much to the gratification of your competitors. One of the first projects accepted by the CSA in 1919 was the development of an Electrical Code at a time when the nine electrical codes for the nine provinces caused a condition that was constantly confused. While the Code is not 100% effective, the fact is that even if it is only 75% effective it is a gratifying achievement.

Before the code was adopted, Canada was a fruitful dumping ground for unapproved and defective foreign electrical equipment. This is no longer the case.

The principles of standardization are constantly growing in importance in the minds of both government and industry. The savings it causes has had and will continue to have a tremendous beneficial effect on the national economy.

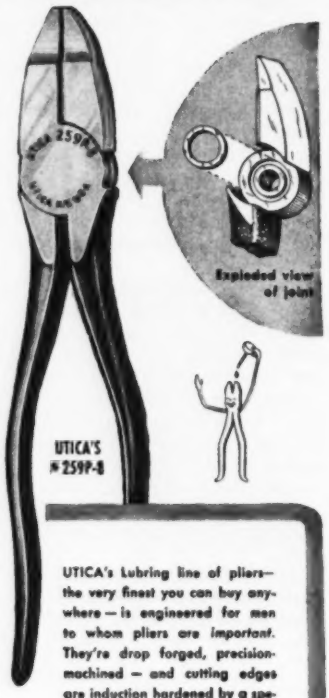
Power Operated Devices Recommended

H. L. STEWART, assistant sales manager Logansport Machine Co, before meeting of the American Society of Tool Engineers at Chicago, Ill.

Power operated work holding devices are now being installed on machine tools to eliminate worker effort, reduce scrap and raise productivity per hour, through more efficient machine utilization, thereby cutting the number of machines needed. Maximum production with minimum scrap is the goal of all companies under the dual production tooling plan.

These new push button controlled

PLIERS THAT OIL THEMSELVES!



UTICA's Lubring line of pliers—the very finest you can buy anywhere—is engineered for men to whom pliers are *important*. They're drop forged, precision-machined — and cutting edges are induction hardened by a special UTICA process.

Each UTICA "Lubring" pliers has a ring of porous iron floating in the joint. This ring serves as a tiny reservoir for oil and releases it to the joint *as it's needed*.

In these days of limited replacements, why not make sure you get the long life and quality that go with UTICA?

UTICA Drop Forge & Tool Corp.
Utica 4, New York
In Canada:
Adam Tool & Supply Co., Ltd., Montreal
Wells-Irons, Ltd., Winnipeg

It Pays — Quality — U TI CA — To Use — Tools

AND THE WORLD'S BEST TOOLS ARE MADE IN U. S. A.

devices are called power chucks and are actuated by either air or hydraulic power. Actual tests have shown that these power chucks reduce time required to clamp the work in the machine by as much as 75%.

Government Control of the Electrical Industry

J. W. McAFEE before the Missouri Press Association

There are instances in which the Federal planners are distorting the purposes of the Rural Electrification Act. They are following practices which I believe in the long run will prove to be of great disadvantage to the distribution cooperatives and their farmer members. The Rural Electrification Administrator is now promoting a plan of super-coops for the purpose of building generating plants and transmission systems. He is becoming head of what amounts to be a great Government holding company.

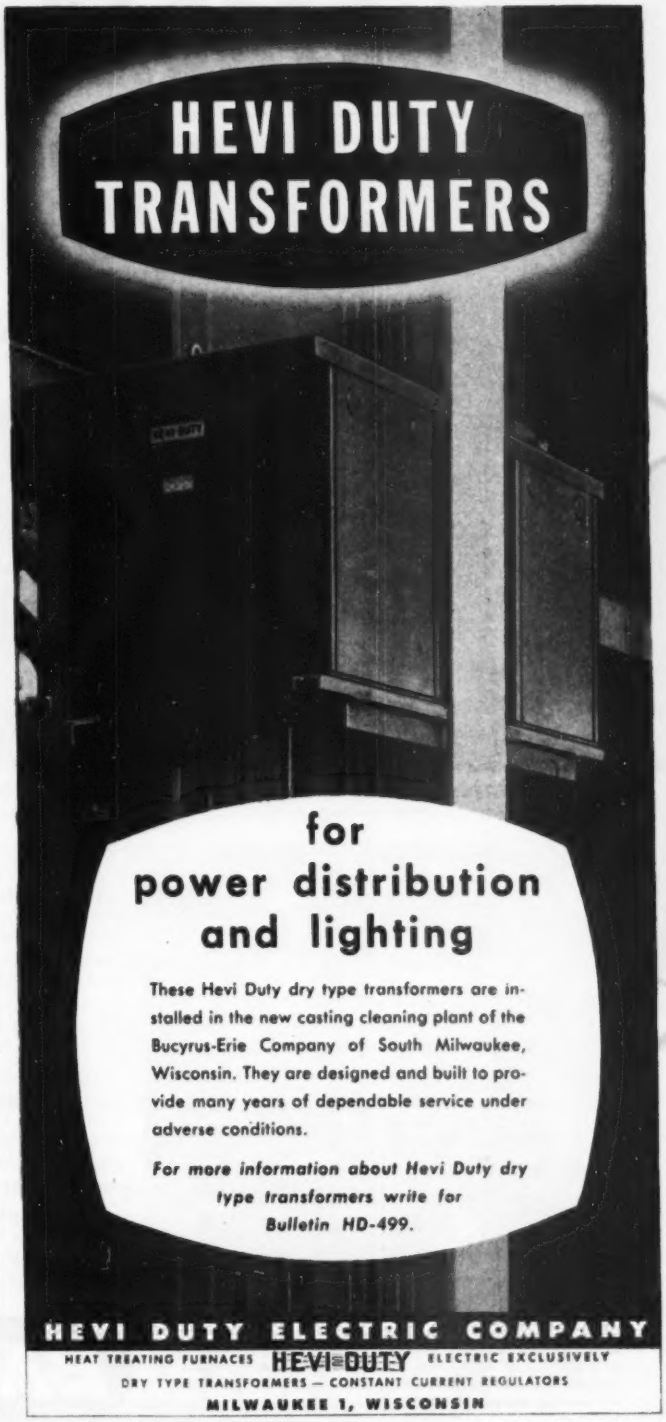
It is contrary to the public interest for an electric company to have rates that are too low. A community can not afford to have an electric company that is financially weak and unable to attract investors. If it is unable to raise capital, it can not provide modern facilities that are needed to keep pace with a growing community and the greater demand for electricity.

Blotter Technique in Plastics

DR. JAMES H. FREEMAN, Westinghouse Electric Corp research scientist before the spring meeting of the American Chemical Society at Milwaukee, Wisc.

We are now able to analyze the "chemical makeup" of Bakelite-type plastics by employing the "paper chromatography" method. Colored "spots", and the distance they "travel" on a piece of blotter-like paper are traced and by that means we are able to identify heretofore unknown ingredients in plastics.

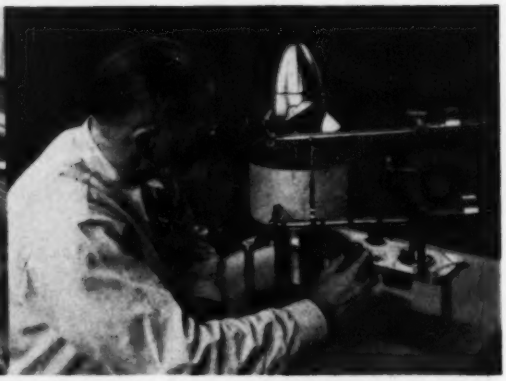
We have known how to make plastics from phenolic resins for about forty-five years, but we have never really known the course of the chemical reactions which occur in the process. This new technique will especially help in the development of insulating varnish and may possibly open the way to better, stronger and more versatile plastics.


HEVI DUTY
TRANSFORMERS
for
power distribution
and lighting
These Hevi Duty dry type transformers are installed in the new casting cleaning plant of the Bucyrus-Erie Company of South Milwaukee, Wisconsin. They are designed and built to provide many years of dependable service under adverse conditions.
For more information about Hevi Duty dry type transformers write for Bulletin HD-499.
HEVI DUTY ELECTRIC COMPANY
HEAT TREATING FURNACES HEVI-DUTY ELECTRIC EXCLUSIVELY
DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

RESEARCH *and*

...the reason BALDWIN TURBINES consistently give Higher Efficiencies and Better Performance

SKILLFUL PATTERN MAKERS carefully form miniature runner blades to the exact shapes planned by the designers.



COMPLEX CONTOURS must be checked hundreds of times before a runner is just right and suitable for testing.

ENGINEERS at Baldwin studying strains in the joints and 1⅛" walls of a 260,000-lb. scroll casing under 285-lbs. hydraulic pressure. Adoption of welded casings at Baldwin is saving 20 to 30% in weight and reducing costs up to 20%.

Undoubtedly you've heard a lot about the *highest efficiency record ever obtained on an impulse-type turbine*—a recent installation by Baldwin. And, of course, you are familiar with the correspondingly high efficiencies of Baldwin-built propeller and Francis-type units.

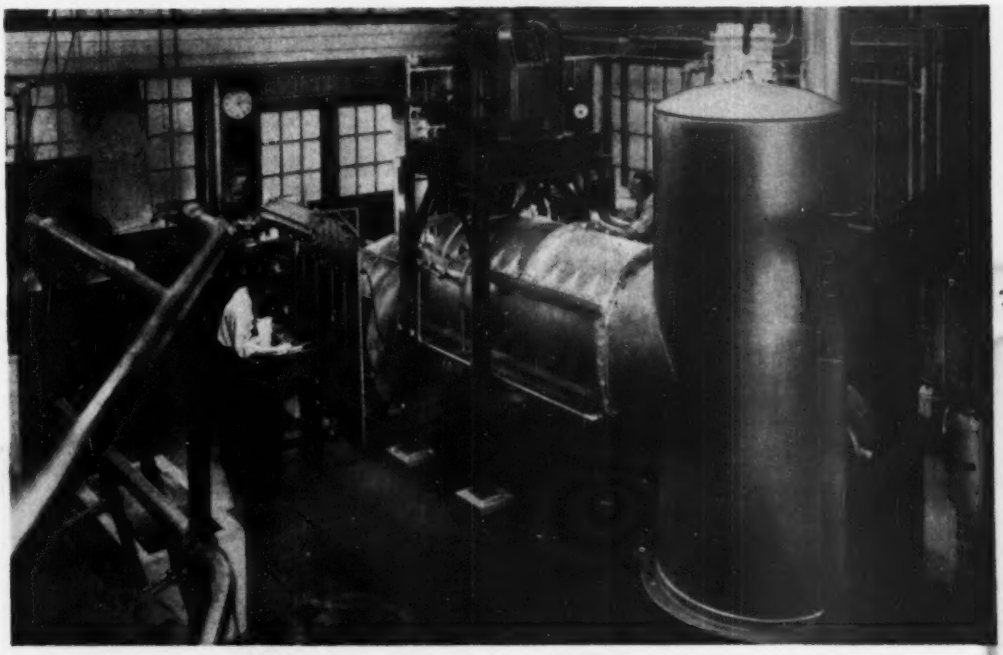
There's a definite reason for this—the pioneering research carried on at Baldwin to improve minor as well as major design characteristics.

Through the years we've tested hundreds of radically-designed model runners, draft tubes, scroll casings, etc.—as well as the widest variety of standard models. And each day we run new tests in our hydraulic laboratory to further extend our field of knowledge.

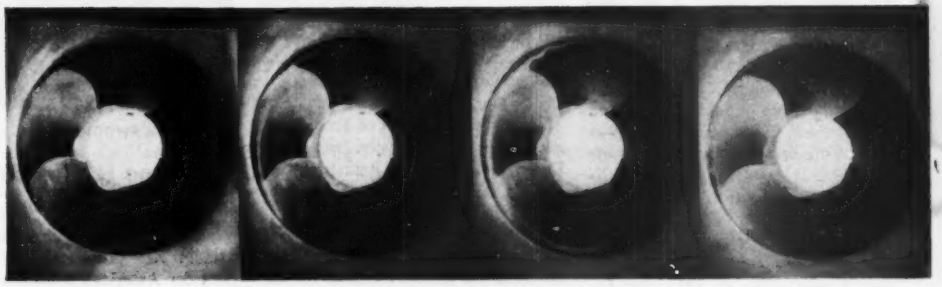
It is this continuing research—plus experience in designing and building all types of turbines for more than a century—that explains the high efficiencies of Baldwin turbines.

BALDWIN

more RESEARCH!!..



SPECIAL CAVITATION equipment enables Baldwin engineers to carefully study this destructive phenomena under a variety of heads, speeds and other variables.



TYPICAL of the cavitation photographs taken by Baldwin engineers are these made on an 11-inch runner. Baldwin was the pioneer in this country in this field.

EDDYSTONE DIVISION
BALDWIN-LIMA-HAMILTON CORPORATION
Philadelphia 42, Pa.

PELTON WATER WHEEL COMPANY
2929 Nineteenth St., San Francisco 10, Calif.

BALDWIN BLH LIMA-HAMILTON

-LIMA-HAMILTON

NEWS ABOUT PEOPLE

G. W. CAMERON A. P. HALL C. F. NAGEL, JR

Alcoa Names 3 Vice Presidents

Company elects Gordon Cameron, Arthur Hall, and C. F. Nagel, Jr, to newly created positions on its staff

The Aluminum Co of America has elected three executives to newly created vice presidencies.

Gordon W. Cameron, Alcoa's treasurer since 1943, becomes vice president and treasurer. Arthur P. Hall, director of public relations and advertising, is now vice president in charge of those fields and C. F. Nagel, Jr, chief metallurgist for the company, assumes the third new vice presidential post.

Did Sales Work . . . Cameron began his career with Alcoa in the sales department in 1916. By 1924 he had been made manager of the company's Boston district sales office. In 1941 he was appointed co-ordinator of Alcoa's program of defense plant construction for World War II, and was elected the firm's treasurer two years later.

Hall started with Alcoa in sales work at St. Louis in 1929. Three years later he was transferred to New Orleans, and went to the Washington district sales office in 1939. He became manager of the Washington office in 1943, and was named an assistant secretary of the company. He was made director of public relations and advertising of the company in 1949.

Heads Research Committee . . . Nagel joined the company in 1915. He became assistant director of the Technical Direction Bureau in 1923 and was made chief metallurgist of the Fabrication Division in 1928. Since 1944 he has been serving as chief metallurgist. He is also chairman of the aluminum company's technical committee and of the research policy committee.

Fink, 'Electronics' Editor, Joins Philco Corp's Staff

Donald G. Fink, an authority on electronics, will join Philco Corp on June 1 as co-director of research operations.

Fink, who has been with "Electronics," a McGraw-Hill publication, since 1934 and its editor since 1946, has been active in the development of the electronics industry in both civilian and military fields.

The magazine editor, a graduate of Massachusetts Institute of Technology and Columbia University, headed the Loran Division of the Radiation Laboratory at M.I.T. during World War II. From 1943 to 1945 he was expert consultant to the Secretary of War and advised the Air Force on the use of Loran and ground forces on the use of radar. At the atom bomb tests at Bikini, Fink was civilian consultant on the staff of the commanding officer.

He was also a member of the first National Television Systems Committee which recommended the present black and white television standards to the Federal Communications Commission.

George Z. Griswold has been placed in charge of all public relations of Cleveland Electric Illuminating Co following the recent retirement of **Frank J. Ryan,** who has been assistant to the president since 1923. Griswold, who has been with CEI as manager of public relations since 1948, assumes only part of Ryan's duties. **Robert H. Bridges,** who has been with CEI since 1940 and was formerly manager of sales advertising, takes over Ryan's other duties as manager of advertising.

Robert W. Powell and **Walter G. Fielder** have been named area superintendents for the Watertown and Potsdam operating districts, respectively, of Niagara Mohawk Power Corp.

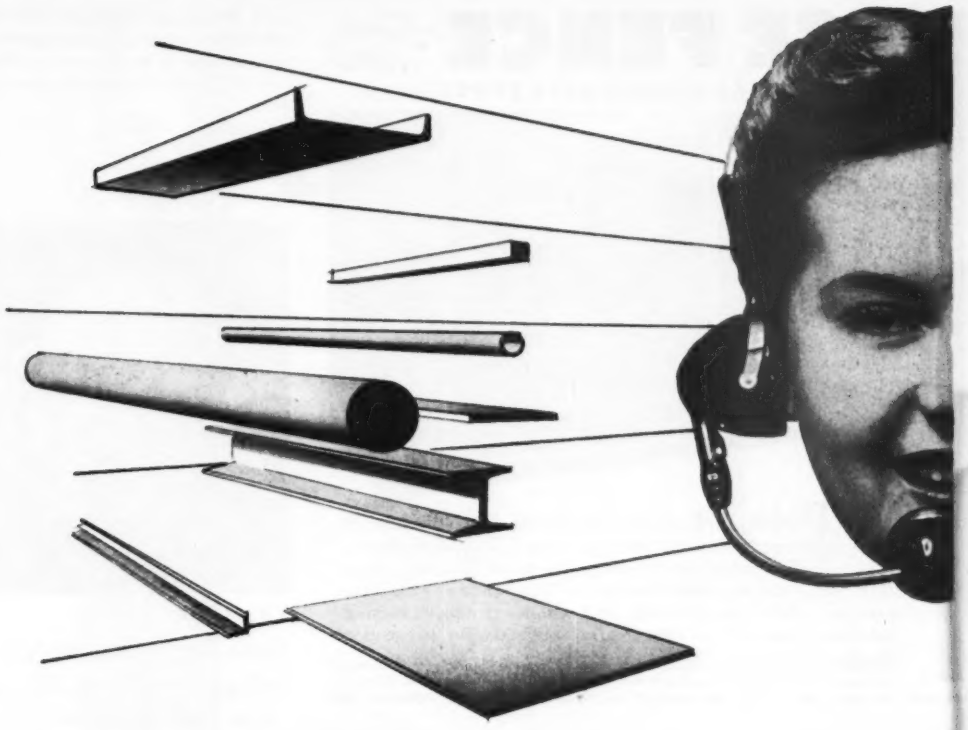
Waldo A. Scruggs has been named general service manager of Highway Trailer Co, Edgerton, Wis. Scruggs has been serving as the service manager of the company's Chicago branch.

JUSTICE LOCKWOOD

Lockwood Is Promoted by American Brass Co

Justice Lockwood has been appointed vice president in charge of sales for American Brass Co, a division of Anaconda Copper Mining Co. He will make his headquarters at Waterbury, Conn. Lockwood has been serving as manager of the Buffalo (N. Y.) branch of American Brass. His successor at Buffalo is Scott H. Patterson, the company's New York City district sales manager.

The new vice president joined Anaconda American Brass Ltd, New Toronto, Ont., in 1929. After spending six years at New Toronto, he was assigned to the Detroit (Mich.) branch, where he represented the firm



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for Suppliers of Power and Light

Contact us for all your steel requirements and extend Government Allotments where they apply. Despite some shortages we can usually take care of most of your requirements. And prompt, personal service is always assured.

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CARBON STEEL BARS—Hot rolled and cold finished
STRUCTURALS—Channels, angles, beams, etc.
PLATES—Many types including Inland 4-Way Safety Plate
SHEETS—Hot and cold rolled, many types and coatings
TUBING—Seamless and welded, mechanical and boiler tubes
ALLOYS—Hot rolled, cold finished, heat treated. Also tool steel
STAINLESS—Alleghany bars, plates, sheets, tubes, etc.
BABBITT—Five grades, also Ryertex plastic bearings
MACHINERY & TOOLS—For metal fabrication

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JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

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Defense against hazards which could hinder or stop production is a major function of Page Chain Link Fence, guardian of persons and property for more than 60 years. NOW is the time to consult the skilled Page Fence erecting firm near you, whose name we will send with fence data on request and who will submit cost estimates, no obligation. For information

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A NAME SYNONYMOUS WITH EXPERIENCE

MAGNATRAN

THIS CATOLOG MAY HELP YOU...

INDOOR-OUTDOOR TYPE

3 KVA to 15KVA inclusive. Modern design for quick, neat installations. Light weight. Air cooled.

INDOOR TYPE

25 KVA to 200 KVA inclusive. Extra large junction box speeds hook-up.

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MAGNATRAN INCORPORATED

TRANSFORMERS AND ELECTRICAL EQUIPMENT

WALTER GARLICK, JR., PRESIDENT

346 SCHUYLER AVE., KEARNEY, NEW JERSEY

MAGNATRAN

in a selling capacity from 1935 to 1939. He was then appointed assistant sales manager at Buffalo and in October 1951, was made branch manager there.

Patterson started with American Brass in 1927 and has been at the New York post since 1950.

A. A. ANDERSEN

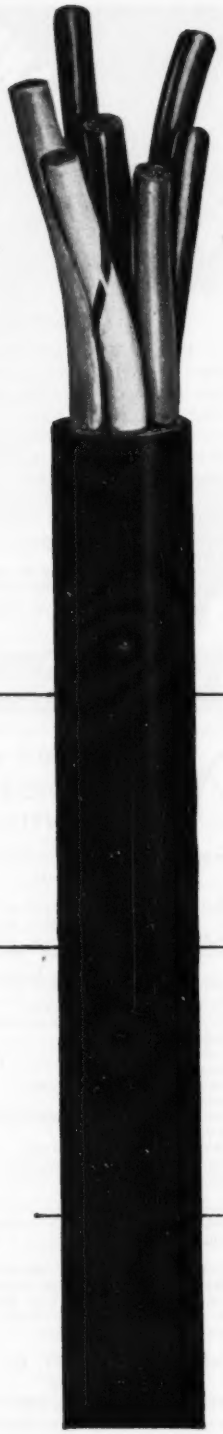
Rome Cable Corp Makes Arthur Andersen a VP

Rome Cable Corp, Rome, N. Y., has appointed Arthur A. Andersen a vice president. He will continue as general manager of the company's Torrance (Calif.) plant.

Andersen has been active in the manufacture of steel tube products for many years. In 1925 he became associated with the Automatic Screw Machine Co, Los Angeles, a company he helped to establish. In 1946 he was engaged in the manufacture of metallic tubing under the name of Andersen-Carlson Manufacturing Co, Torrance. Four years later the Andersen-Carlson facilities were purchased by Rome Cable. At that time Andersen was made general manager of the Torrance plant.

Philip M. Schloss, who has been serving as assistant to the president of Preformed Line Products, Cleveland, Ohio, has been appointed general sales manager. Previous to joining this company in 1951, Schloss had been with the General Electric Co for 15 years.

Fred S. Bacon, assistant sales manager of Rockbestos Products Corp, New Haven, Conn., has resigned to become



ROCKBESTOS PNR CONTROL CABLE

provides

More Service Hours, Uses Less Space

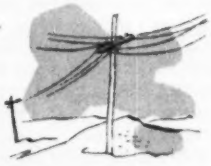
than Conventional Cable

46% smaller in area* . . . 28% smaller in diameter*, Rockbestos PNR helps you extend critical steel conduit allotments...provides substantial savings in installed cost. Its smaller size means you can put 12 conductor cable in conduit where you now use 6 or 7 — or you use smaller conduit and fittings to save on steel and installation costs.

Compare the advantages of PNR shown below, and you readily see why Rockbestos PNR is your best buy.

Dielectric break over 40 times operating voltage.

Lighter and smaller. Easier to handle, store, ship, pull through conduit.



Versatile . . . bury it in the ground! Hang it on a pole! . . . Use it in a conduit.

Stands weather . . . sunlight, chemicals, oil, grease, gasoline, alcohol.

Flexible to —25°C (—13°F). No cracking!

Rated 600 volts . . . conductor operating temperature 168°F (75°C). Available #12AWG-19/25, #PAWG-19/22. Any number of conductors.

ROCKBESTOS PNR

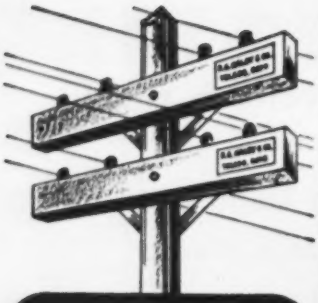
. . . another different, better cable by

ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN 4, CONN.

originators of A. V. C. cables

New York • Cleveland • Detroit • Chicago • Pittsburgh • St. Louis
New Orleans • Los Angeles • Seattle • Oakland, California

*Average determined by comparison with competitive control cable



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Latest and most modern facilities for
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LIGHT WEIGHT
•
TWO Strategically Located Yards:
Minneapolis, Minn.
Findlay, Ohio

R. G. HALEY & CO.
SPITZER BLDG.
TOLEDO 4, OHIO

general sales manager of Gamewell Co, Newton Upper Falls, Mass., effective May 1. Before going to New Haven he was manager of the central station department for Westinghouse Electric Corp at Boston.

E. J. DYESS

Dyess Appointed a VP by Southwestern G&E

Earl J. Dyess, division manager at Fayetteville, Ark., for Southwestern Gas & Electric Co, Shreveport, La., has been named a vice president.

A veteran of 27 years' service with Southwestern G&E, Dyess began his career with the utility at Marshall, Tex. He was appointed division engineer in 1938, remaining in that position until 1943. At that time he was made division manager at Fayetteville.

Assumes Treasury Post

Josiah V. Colley has been elected treasurer of Dayton Power & Light Co. The utility also appointed Samuel J. Schiml comptroller. Colley who began with DP&L in 1922, has been comptroller since 1946. Schiml has been assistant comptroller since 1950. He joined the company in 1927.

Fowler Blauvelt has been appointed manager of wire and cable sales of the Textile Products Division of Owens-Corning Fiberglas Corp, New York. Blauvelt joined the corporation in 1945.

E. A. Woodhead, Idaho Power Co's veteran power plant builder and oldest employee in years of service, has been named chief consulting engineer

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of the company. Formerly superintendent of power plants, he will be available for special assignments and for engineering consultations. He started with the utility in 1906.

B. C. RUSSELL

Idaho Power Advances Russell to a New Post

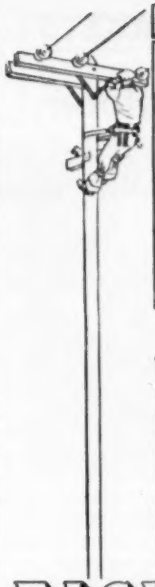
B. C. Russell, general superintendent of Idaho Power Co since 1944, has been elected a vice president. In his new position he will continue to superintend the operating departments.

Russell has served more than 40 years with Idaho Power and a predecessor company, Idaho Railway, Light & Power Co. He was made assistant superintendent of power in 1919, superintendent of power in 1921, and assistant general superintendent in 1943.

J. R. David, formerly manager of the Cleveland Electric Illuminating Co's industrial sales department, has been appointed general sales manager of Gearhart Co, Brookhaven, Ga. David has been in public utility sales work for 21 years.

OBITUARY

Frederick Elwell, 78, superintendent of all British Columbia Electric Co hydro powerhouses for 15 years before his retirement in 1940, died recently at Coquitlam, near Vancouver. A BCE employee for 29 years, he served as superintendent of the Lake Buntzen powerhouse from 1911 until his appointment as general powerhouse superintendent in 1925.



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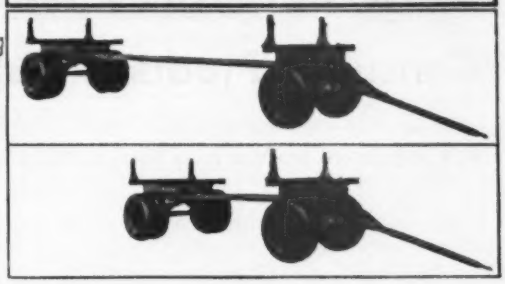

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Consumer Products Outlook . . .

. . . for Westinghouse Electric Corp is bright for '52. The firm expects to produce more than in '51, McKibbin reveals

Westinghouse Electric Corp will produce more consumer products this year than in 1951. This opinion was expressed by J. M. McKibbin, Westinghouse's vice president in charge of consumer products, in a recent address before the Detroit Adcraft Club at the Hotel Statler.

The estimate was based on the assumption that more of the critical materials, such as copper and steel, will be available for appliance and TV production than during 1951. A change in the defense program could alter this picture on short notice, of course.

Big League Selling Needed . . . McKibbin said the chief factor limiting Westinghouse consumer goods output last year was scarcity of materials; the biggest problem this year may well be consumer sales resistance. The buying power is there, he added, but today it takes "big league" selling to separate the average man from his dollar.

"The post-war days of easy selling are gone," he emphasized. "We are back to a more normal condition where the buyer must be really sold on a product before he will buy." This is a healthy condition for all concerned and it offers a challenge to the sales force of every company, McKibbin declared.

Saturated Market? . . . The Westinghouse official said that talk of a "saturated market" in the appliance field is nonsense to the people who have watched the consumption of electric power double in the last ten years and know that another 100% increase is indicated in the ten years ahead.

Improvement of existing products and development of new products will continually open up new markets, he stated. McKibbin said "The market for such products as electric dishwashers has hardly been touched. And it is not hard to guess what will happen to TV demand when hundreds of new stations eventually go into operation as a result of new channel allocations."

McKibbin said the conviction that the electrical consumer products market is steadily expanding has prompted Westinghouse to enter into a major expansion program for the making of these products—appliances, TV, radio, and lamps—as well as for industrial products. He revealed that approximately 40% of the company's $296-million expansion program now under way is for facilities which ultimately will be devoted to consumer goods production. Last year 26% of Westinghouse production was in consumer products.

New Plants . . . He said the largest single plant ever built by Westinghouse now is under construction at Columbus, Ohio. The plant will produce jet engine parts until defense needs no longer require this type production. Then it will be converted to appliance production.

A new plant at Metuchen, N. J., which was planned before the Korean conflict for television receiver production, now is being used to build electronic defense equipment. As defense orders fall off and materials are freely available, Westinghouse expects to produce television receivers at the New Jersey plant, McKibbin pointed out.

Idea to Relieve Engineer Shortage Offered by GE

General Electric Co has come up with a unique idea to help alleviate the serious shortage of engineers.

Looking to the future, it has placed a special insert in the current issues of "Scholastic Magazines" to encourage young people at the junior high school age level to think of engineering as a career. The eight-page insert is entitled: "General Electric Looks at Engineering Tomorrow."

General Electric is of the belief it is at that age that a student should develop the aptitude for mathematics and science courses, which later become requirements for engineering degrees.

The publishers are cooperating by running a lesson plan in the Teachers' Edition suggesting ways to utilize the General Electric insert in the classroom.

Alcan Renews Contract Offer to United States

The Aluminum Co of Canada recently renewed its offer of a long-term aluminum contract with the United States but has reduced considerably its original demands for a U. S. market guarantee.

The new offer, replacing one which expired April 18, is a toned-down version of its predecessor, which was strongly opposed by domestic producers.

The old offer would have required the U. S. to buy up to 900,000 tons of aluminum from Alcan between 1955 and 1959 if the company were unable to sell this amount to private American buyers during those years. The latest offer asks for a guaranteed sales of only half as much aluminum, or 450,000 tons.

The latest offer calls for Canadian exports of 1,110,000 tons of aluminum between now and 1958, which is substantially below the 1,850,000 tons in the earlier offer. On an annual basis, Alcan would promise to export a minimum of 200,000 tons of aluminum each year during the four-year period between 1955 and 1958. This is a shorter period of time and a lower overall amount of metal than under the old offer, which called for exports of about 300,000 tons annually between 1955 and 1959.

Alcan, in return for stepping up exports of aluminum to this country, wants the U. S. government to guarantee a market for a substantial amount of the metal. The Canadian company wants the U. S. to promise to buy up to 100,000 tons of aluminum annually in the years 1955 through 1958 and to buy an additional 50,000 tons in 1954. The purchase guarantee would be exercised only if Alcan were unable to dispose of these amounts of metal to commercial

American purchasers during period covered by the contract.

Any aluminum the government purchased under the contract would go into the United States' strategic stockpile.

Alcan, which is now building a large new aluminum production project at Kittimat, British Columbia, costing $300 million, is eager to secure the purchase agreement because of its financial commitment at the Kittimat project.

To date, the U. S. has not agreed to take up Alcan's offer.

MANUFACTURING BRIEFS

Westinghouse Electric Corp is building at its Sunnyvale, Calif., plant, three 60,000-kw central station steam turbines. The units, which will be delivered in 1954, will be the first to be built in the West.

New name of the Larkin Lectro Products Corp, Pine Bluff, Ark., is Central Transformer Corp. The company will continue to manufacture liquid-immersed and dry-type power and distribution transformers. The name change will not affect the management, financial structure, policy, or obligations of the organization.

Ward Leonard Electric Co, Mount Vernon, N. Y., has moved its Los Angeles branch office and warehouse to 1605 E. Olympic Blvd., Los Angeles 21. H. S. Eales is manager of the LA office.

Green Fuel Economizer Co, Inc, Beacon, N. Y., has acquired the U. S. patent rights of Aerodyne Dust Collectors from the Aerodyne Atlantic Corp, New York.

SALES ASSIGNMENTS

COMPANY STAFFS

Templeton, Kenly & Co, Chicago manufacturers of Simplex mechanical and hydraulic jacks, has named Arthur Templeton Southwestern divisional sales engineer. Templeton has served for the past two years as a sales engineer for the firm in the Chicago area. He will make his headquarters at 6505 Aberdeen Ave., Dallas, Tex., covering Texas, Oklahoma, and Louisiana.

S&C Electric Co, Chicago, has named Burr T. Carmody as a sales engineer. His territory includes part of Chicago, Gary, Ind., and the lower peninsula of Michigan.

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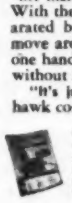

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NEW ELECTRICAL CONSTRUCTION

A weekly selection of U. S. electrical construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is indicated or implied

UTILITIES

Proposed Construction

Arizona—Sulphur Springs Valley Electric Co-operative, Willcox, system imprvts. and completion of previously approved construction, Cochise Co. $630,000.

Calif., Santa Clara—City, City Hall, voted $200,000 bonds city's electric distr. system.

Fla., Hollywood—Superior Electrical Industries, Hollywood, plant addns. $1,000,000.

Ga., Atlanta—Bd. Regents, University System of Georgia, 20 Ivy St., electrical distr. system addns., steam distr. system addns. at Georgia School of Technology. Plans deposit $15 each job. Newcomb & Boyd, 1306 Spring St. N. W., Atlanta, Ga., engr.

Kan., Fort Leavenworth—Purchase & Contracting Office, Fort Leavenworth, repairs, imprvs. to electric distr. and street lighting, Inv. 52-66.

La., Lake Charles—U. S. Eng., 313 P. O. Bldg., Galveston, Tex., armament and electronics bldg., AIO shop, Lake Charles Air Force Base, Inv. 52-78.

Mich., Bay City—City, Municipal Light Dpt., imprvs., extensions municipal light plant, $500,000.

Miss., Houston—Natchez Trace Electric Power Assoc., Houston, warehouse-office, $100,000. Plans deposit $50. Spain & Higgers, Deposit Guaranty Bank Bldg., Jackson, archts.

North Dakota—Reclamation, Dpt. Interior, Bismarck, construct Custer Trail and DeVaul sub-stations, Missouri River Basin Proj., Transmission Div., Spec. 600C-91.

S. C., Greenville—U. S. Eng., 33 Customhouse, Charleston, electrical distr. sys. ENG 28-081-52-57.

Tennessee—Plateau Electric Co-operative, Oneida, 119.6 mi. rural distr. lines, Scott and Morgan Counties. Plans deposit $10. McWhorter & Franklin, 3200 Belmont Bldg., Nashville, engrs.

Texas—Deaf Smith County Electric Co-operative, Hereford, 9 mi. 69-kv transmission lines; one 7,000 kva sub-station with 4 breakers; 25 mi. rural distr. and tie lines, Hereford and Deaf Smith Counties. $130,000. H. N. Roberts & Assoc., 1310 Avenue "Q", Lubbock, consult. engrs.

Texas—Brazos River Transmission Electric Co-operative, Inc., 2404-12 La Salle Ave., Waco, 26.1 mi. 69 kv "H" frame transmission line, Johnson Co. Plans deposit $10.

Va., Norfolk—WTAR, 720 Boush St., TV-tower. $150,000.

Alaska—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars Palmer, one 5,000 kva, 110,000 delta-to 12,470 grounded wye/7,200-volt, 3-phase, 60-cycle, outdoor-type, power transformer, with 3 single-pole, station type outdoor lightning arresters mounted on the tank and 2 single-pole, self-supporting station-type lightning arrester for the Palmer sub-station, Eklutna Proj. Inv. No. DS-3709.

Low Bidders & Contracts Awarded

Arizona—Westinghouse Electric Corp., G & E Bldg., Denver, Colo., CA, $161,726, Schedule 1, three power capacitor equipments with spare parts for Tucson sub-station, Davis Dam Proj. Spec. DS 4571. Bureau Reclamation, Dpt. Interior, Bldg. 1 A., Denver Federal Center, Denver, Colo. Bids Jan. 10, awarded Apr. 11.

California—Guy F. Atkinson Co., 10 W. Orange Ave., South San Francisco, Calif., CA, $5,772,959, Folsom Power Plant and appurtenant works at Folsom Dam Site, Spec. DS 3662. Bureau Reclamation, Dpt. Interior, Sacramento, Calif. Bids Apr. 2.

Fla., Jacksonville—General Electric Co., River Rd., Schenectady, N. Y. CA, $140,542, furnishing, installing, 3 outside portable sub-stations, N. Main St., Englewood and Lines Ave.; Westinghouse Electric Corp., 545 E. 4 St., Jacksonville, Fla., CA, $93,788, furnishing, installing 2 outside portable sub-stations at Lovegrove Rd. and Lake Forest, City, City Hall, Jacksonville, Fla. Bids Mar. 20.

Ind., Richmond—Riley Stoker Corp., 122 S. Michigan Ave., Chicago, Ill. CA, $1,000,000, installation boilers and equipment for municipal light plant, City, City Hall, Richmond, Ind. Awarded Apr. 5.

Nebr., Lyons—R. V. Leary Co., Inc., 937 5th St., Des Moines, Ia., CA $89,993, power plant extens., imprvs., incl. generating unit move and reset oil storage tanks, building work, removal of old units, City, Lyons, Neb. Fulton & Cramer, 922 Trust Bldg., Lincoln, Neb., engrs. Bids Apr. 7.

N. Y., Rome—Peerless Constr. Co., 330 W. 42 St., ew York 18, N. Y. CA. $1,096,730, electronic test facilities at Griffiss Air Force Base. U. S. Eng., 50 Lafayette St., New York 13, N. Y. Bids Mar. 28.

Tex., Dallas—Lone Star Gas Co., 1216 Wood St., Dallas, Tex., Force account. $175,000, some electric transmission line constr.

Tex., Texas City—City, Texas City, Tex., Own Forces, $60,000 final construction unit on electric traffic sys. expansion engr.

Alaska, Kodiak—Drake-Puget Sound, 2929-16th Ave., S. W., Seattle, Wash., LB $2,878,712, rein.-con. school, two 2 story steel frame barracks, 1 story rein.-con. Electronics Bldg., rein.-con. Laundry addn., and 17,900 ft. 18 in. c.i. water supply main at Naval Station, Spec. 21604. P. WKs. Officer, 7th Naval Dist., Kodiak, Alaska. Bids Apr. 10.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Ariz., Phoenix—Valley National Bank, Professional Bldg., plans by H. H. Green, Security Bldg., 6 story bank and office. $3,500,000.

Fla., Fernandina—Container Corp. of America, Fernandina, plant addns. $4,000,000.

Md., Silver Spring—Armstrong Apartments, Inc., A. Klein, vice pres., 145 Kennedy St. N.W., 10 buildings, 210 apartment units, north of East West Hy., west of future Columbia Blvd. $2,000,000.

Mass., East Boston—State, State Airport, Management Bd., Boston, central terminal bldg., Logan Airport. $7,000,000.

Neb., Omaha—City, City Hall, 18 and Farnam Sts., municipal auditorium, $6,000,000. L. A. Daly Co., Insurance Bldg., archt.

N. J., Winslow Twp.—N. J. Dpt. Purchase & Property, 318 State House, W. State St. Trenton, New Jersey State Mental Hospital, $12,000,000.

N. C., Marion—Clinchfield Mfg. Co., Marion, plant addns. $2,400,000.

O., Maple Heights—Northfield Center Development Co., (Maurice J. Fishman and A. Siegler & Sons), 4923 Lee Rd., Shaker Heights, shopping center, apartment and home project. $17,000,000.

Pa., Pittsburgh—Pick Hotels Corp., Roosevelt Hotel, 7 story brick, block hotel addn. $4,000,000.

S. C., Spartanburg—Draper Corp., Spartanburg, plant addns. $2,500,000.

Tenn., Elizabethton—J. & J. Corrugated Box Corp., 81 Ferry St., Fall River, Mass., plant. $1,350,000.

Tex., Dallas—General Instruments, Inc., 6000 Lemmon St., plant, (electronic and electrical equip.). $10,000,000.

Tex., Harlingen—Valley Baptist Hospital, c/o T. H. Morrison, Jr., Harlingen, hospital, incl. polio treatment center. $2,000,000.

Tex., Longview—Powers Mfg. Co., c/o V. A. Clements, pres., Longview Natl. Bank, oil pipe fittings mfg. plant. $4,795,537.

Va., Danville—Thompson Products, Danville, plant addns. $1,000,000.

Wash., Seattle—Seattle Steam Corp., Henry Bldg., Zone 1, rehabilitate steam heating plant and distr. system, $1,000,000.

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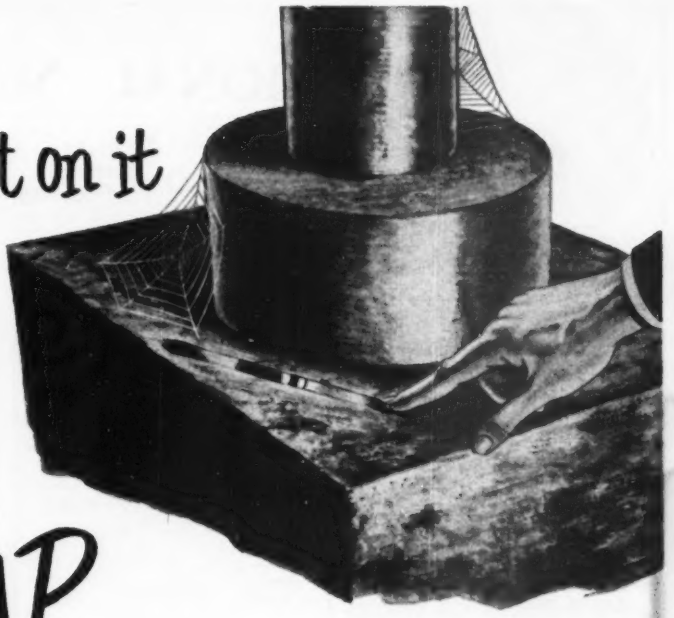
it may be precious scrap!



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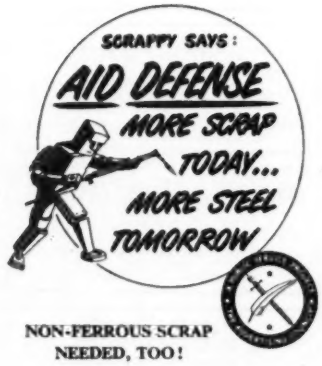

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BOOK REVIEWS

Electronics

Theory and Application of Industrial Electronics. By John M. Cage. Published by McGraw-Hill Book Co New York 36. 290 pages, illustrated. Price $4.75.

This is an integrated treatment of electronic circuits and devices outside the field of communications. Many applications are described. The theoretical approach is sound, although mathematics is not employed to the point of obscurity. It is written primarily for college graduate and undergraduate courses, but should be valuable to practicing engineers who need to review the principles of the electronic art in relation to applications other than communications. Problems at the end of chapters combine theory with simple workable applications.

Furnaces

Industrial Furnaces, Volume 1. By W. Trinks. Published by John Wiley & Sons, Inc New York 16. 526 pages, illustrated. Price $10.00.

A fourth edition, this book retains the comprehensive content of the third and brings it up-to-date by incorporating the most recent scientific facts, design and operating principles and techniques. Infrequently used material has been moved to the appendix and 94 new illustrations have been added. All calculations and tables have been changed from gross tons to net tons in accord with current usage.

Water Treatment

Water Treatment. By Eskel Nordell. Published by Reinhold Publishing Corp New York 36, New York. 526 pages, illustrated. Price $10.00.

Industrial rather than community use is the field of this book by a Permutit specialist and one does not have to be a chemist to benefit from it. Before classifying some 350 industrial processes as to their quantitative and qualitative needs for water there is much tabular data about the waters of the country (mostly west of the Hudson). Boiler feed water is accorded one of the chapters, aeration and deaeration others each. The differences between the zeolite (hydrated double silicates) and demineralization process of cation exchange are clearly defined. Closing chapters deal with silica removal and the lime-soda processes. Those who have had troubles with cooling towers, transformer and hydrogen-cooling systems and clogging of water-spray lines will find the established remedies in these pages.

Civil Engineering

Data Book for Civil Engineers. By Elwyn E. Seelye. Published by John Wiley & Sons, New York 16, N. Y. Vol. I. Design. 500 pages Price $10. Vol. II. Specifications and Costs. 505 pages. Price $13.00.

These two volumes are extensive revisions of 1946 books. Neither edition professes to be a handbook because the intent is to confine the material to reference information in data sheet form. The design volume thus has numerous items of interest and usefulness to electrical engineers confronted with tasks embodying steel, timber, concrete, wind stresses, foundations, column footings, soil mechanics, and flow in pipes. Quantitative facts about all these typical subjects are afforded in intelligibly arranged manner. Interspersed among sections devoted to structures, roads, railroads will be found information on dams, docks and airport lighting patterns. The specifications volume has sections on metallic paints, building components, athletic fields. Costs comprise one-third the pages in Volume II. A glossary of terms embraces some 100 pages. There is also a discussion of depreciation from engineer's viewpoint.

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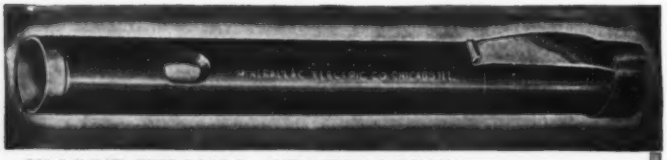

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CATALOGS • BULLETINS

● DRY BATTERIES: General Dry Batteries Inc, Cleveland, Ohio has announced that its new catalog is ready for distribution. It is designed to serve as a ready reference sheet for dealers and contains complete technical information about dry batteries.

● METERS AND CONTROL SYSTEMS: Two Bulletins, No BA-927 "Bailey Armortube" and No 1023 "Bailey Control for Oil and Gas Fired Boilers," are now available. The former deals with the use of armortube cable in the installation of pneumatic control systems. Published by Bailey Meter Co, 1050 Ivanhoe Rd, Cleveland 10 Ohio

● LIGHTING: A new fully illustrated 60-pg catalog containing complete information on fluorescent, incandescent and slimline lighting fixtures has been issued by the Kayline Co, 2480 East 22 St, Cleveland, Ohio. This lighting guide may be obtained by writing to the company.

● CONTINUOUS SAMPLING MONITOR: General Electric Co, Schenectady 5, N. Y. announced that a new booklet, GEA-5738 has been released. It contains photographs, diagrams of operation, construction and range of the continuous sampling monitor, a new device to simplify quality control.

● EXPLOSION PROOF MOTORS: Construction details of explosion-proof, fan-cooled and non-ventilated motors are described in a bulletin recently released. These fan cooled Type APZZ motors are available in ratings of 2 to 100 hp and the non ventilated Type APKK in ratings from ½ to 2 hp. Copies of the bulletin, "Allis-Chalmers Explosion Proof Motors" 51B7286A may be obtained from the company, 932 S 70 St, Milwaukee, Wisc.

● ELECTRIC POWER: An 8-pg case history describing the operation of the largest independent producer of electric power for manufacturing in Connecticut is now available. Reasons for this plant to achieve an evaporation rate of 12.8 and a cost per 1000 lbs of steam of $.706 are fully discussed. For copies write for Bulletin R-8, The Hays Corporation, Michigan City, Ind.

● EDUCATIONAL AIDS: A new catalog listing free low-cost materials that can be used in furthering power supplier cooperation with rural youth programs has recently been made available. This illustrated 14-pg booklet, "Educational Aids for Power Supplier Dual Programs," covers all phases of electric living on the farm and at home and may be obtained from Westinghouse Electric Corp, School Service, Dept T, Box 1017, Pittsburgh 30, Pa.

● STUD WELDING: A new handbook devoted exclusively to the maintenance of stud welding equipment has recently been published. This 12-pg booklet is entitled "Maintaining Your Stud Welder" and has been offered by KSM Products, Inc, Merchantsville, N. J.

● DISC BRONZE VALVES: The Fairbanks Co, 393 Lafayette St, New York 3, N. Y. has made available a new circular describing renewable composition disc bronze valves. It contains specifications and sizes of various valves and information concerning it may be obtained by writing the company.

● STITCHED CANVAS BELTING: A new catalog describing development of new treatments and techniques for prolonging life and strength of stitched canvas conveyor and elevator belting is now available. New impregnating compounds that completely saturate the belt fibres and new stretching methods are described in this book by C R Daniels, Daniels, Md.

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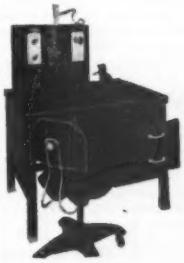

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Qu	KW	Make	Desc.
1	—6000	Al. Ch.	Condensing 200/250 I.S.P. 2300 v 3/60 Exc. & Surf co Cond.
1	—750	G.E.	Condensing — 425 lbs. 750 TT I.S.P. 440 V. 3 ph. 60 cy — Built 1944
1	—50	Moore	Non-condensing 150/200 lbs. I.S. 5/35 lbs. G.B.P. 3/60/480 volts Direct Connected Exciter
1	—400	Westg	Non-condensing — 125/150 lbs. I.S.P. 5/10 lbs. B.P. — 240/480 v. 3 ph. 60 cy.
1	—300	G.E.	Non-co densing 150/175 I.S.P. 5/10 B.P. — 480 v. 3 ph. 60 cy.

SYNCHRONOUS CONDENSERS

KVA	Make	Type	Volts	Speed
1—5000	Whse		2400/4150	600

MOTOR GENERATOR SETS
3 ph. 60 cy.

Qu	KW	Make	Speed	DC Volts	AC Volts
2—	2000	G.E.	300	666 25 cy.	11000
1—	1500	G.E.	72)	600	13200
1—	1500	G.E.	300	275	2200/4400
1—	1000	G.E.	900	300	4100/6900
1—	1500	G.E.	600	600	2300/4150
2—	1000	Whse.	900	600	2300/4150
1—	500	Whse.	900	250	6900/13200
1—	500	Whse.	1200	125/250	2300
1—	500	Whse.	900	250	440
1—	500	G.E.	720	125	2300
1—	400	G.E.	720	250	440/2300
1—	350	G.E.	900	125	4150
1—	150	G.E.	1200	275	2300
1—	150	Whse.	1200	275	2300

TRANSFORMERS—60 Cycle

KVA	Make	Type	Ph	Voltages
3—1250	G.E.	HVDDJ		6600x550
3—1250	G.E.	HT	3	2296../13200x440/2300
1—1200	ABB	OISC	3	13200/6600x480
1—1150	A.C.	OISC	3	14200x480/2400
3—1000	Pitts	OISC	1	22000x13200/2300
3—1000	G.E.	HVDDJ	1	2300x480

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1—1500 KVA G.E., 3 Ph., 4150V. 2300V Pyranol
1— 200 KVA G.E., 3 Ph., 2400-220 Sec.
3— 100 KVA Wagner, 1 Ph., 240V pri., 120V sec.
2— 100 KVA Newark, 440V 3 Ph., 220V 2 Ph.
6— 50 KVA G.E., 1 Ph., 13,450V. 120/240 Sec.
2— 25 KVA G.E., 1 Ph., 11,500V pri., 230/460V
3— 25 KVA G.E., 1 Ph., 500V. pri., 110/220 sec.

SYNCHRONOUS MOTORS

1— 300 H.P., Elec. Mach. 720 RPM, 3 Phase 60 cyc., 2200V T E F Cooled Outdoor service.
1— 150 H.P., G.E., 1000 RPM, 220V.
2— 150 H.P., Al. Chal. 360 RPM, 440V.

MOTOR GENERATOR SETS

1—1000 KW G.E., 500 V. 514 RPM, 4000V Sy.
1— 200 KW Whse., 275V, 900 R.P.M., 220 V Syn.
1— 176 KVA West., 1 Ph., 220V, Motor 3 Ph., 440V.
1— 150 KW. G.E., 125/250V, 1200 RPM, 2300 Syn
1— 100 KW G.E., 250V, 900 RPM, 2300V, Syn.
1— 75 KW C.W. 250V, 1200 RPM, 2300/3150V Syn.

SLIP RING MOTORS

1— 200 H.P., West. CW, 600 RPM, 440V.
1— 250 HP West., CW, 600 RPM, 440V.

SYNCHRONOUS CONDENSER

1—200 H.P. West. CW, 600 RPM, 440V.
1—2500 KVA Whse., 720 RPM 2200V with DC EXC.

Large Stock of A.C. and D.C. Equipment

LETTERS TO THE EDITOR

"Little Main Streets" Can Use Mercury Lamps, Too

THIS interesting article on street lighting evoked the following letter and reply . . .

New Street Lights but No Tax Increase

To the Editor:

I read with considerable interest the article "Little Main Streets Can Use Mercury Lamps, Too" in the March 10 issue of Electrical World. Several of our utility customers serve small communities where street lighting contracts call for payment with the greater part of the tax receipts. This certainly must have been the case in the town of Cold Spring, with a population of 1,786, where 15 luminaires were installed.

I will be interested to know if in any case it was necessary to increase the taxation to secure the additional lighting and the attitudes of the communities in which such was the case.

J. H. Leavitt
Lighting Specialist
General Electric Co
Philadelphia 2, Pa.

• These are the comments of the author of the article:

With respect to Cold Spring, I am unable to say about how much, if any, the tax rate was increased. We negotiated a revised street lighting contract with the village board about that time. This contract had a saving and a great deal of this annual saving in operating cost was applied toward changing the existing incandescent lighting to the mercury system.

I do not know of any area where the tax rate was increased, at least to any great extent. It so happens that in most of these communities there is considerable new home construction. This automatically increases the valuation of the lighting district and thereby eliminates the necessity for increasing the tax rate. It is possible for many communities to improve their lighting by adding a few mercury lamps without effecting an increased tax rate in the district.

The attitude of the officials in the communities is favorable. Of course, they will use care in not adding too many lights to make the tax rate prohibitive. Some of these communities are impressed so greatly with mercury lighting that it is their intention to gradually expand the use until all of their business streets or heavily traveled thoroughfares are 100% mercury.

We have had no adverse criticism of any mercury light as far as color and operation are concerned. I think the residents of the community really realize that they are getting a lot more for their money where traffic problems are serious in these small communities.

Taylor M. Barr
Lighting Representative
Central Hudson Gas & Electric Co
Poughkeepsie, N. Y.

Ashless Coal a Dream

To the Eidtor:

Commenting on the editorial "Perfect Fuel," page 88, March 10, Electrical World, the dream of ashless coal is a most pleasant one. That is about all that can be said for it, although it has been demonstrated that coal can be cleaned of ash to a small fraction of 1% if one wishes to pay the price. A patent by Rose and Hill, now expired, describes a process for dissolving coal in tar fractions, filtering out the ash, and restoring the coal as finely divided particles smaller than those from pulverizers. The process has been little used in this country, but not for preparing coal for steam boilers.

Some clay and certain rocks that are part of the coal emerging from the mines can be removed quite readily by washing. However, the bulk of the ash is very intimately associated with the carbonaceous material. To reduce the ash content of the coal by processes that have any chance of being economical, a substantial portion of the fuel value must be thrown away because of this intimate association. Such a cleaning process would sort high specific gravity or high ash pieces from pieces of lower ash content. In addition to the cost of operating the cleaning unit, there would be the economic loss of fuel which already has a burden of mining cost on it.

Elmer R. Kaiser
Assistant Director of Research
Bituminous Coal Research Inc
Columbus, Ohio

Expanded Metal

To the Editor:

Your April 7 issue carries, on page 118, a story entitled "Wire Mesh Cut-off Cuts Lighting Costs," dealing with the novel use of expanded metal for ceiling light diffusion. While the story was well presented, it was very disappointing to discover that no credit was given Wheeling Corrugated Company who made the expanded metal for this ceiling installation.

Norman Odell
Public Relations
Cunningham & Walsh, Inc
40 East 34th Street
New York 16, N. Y.

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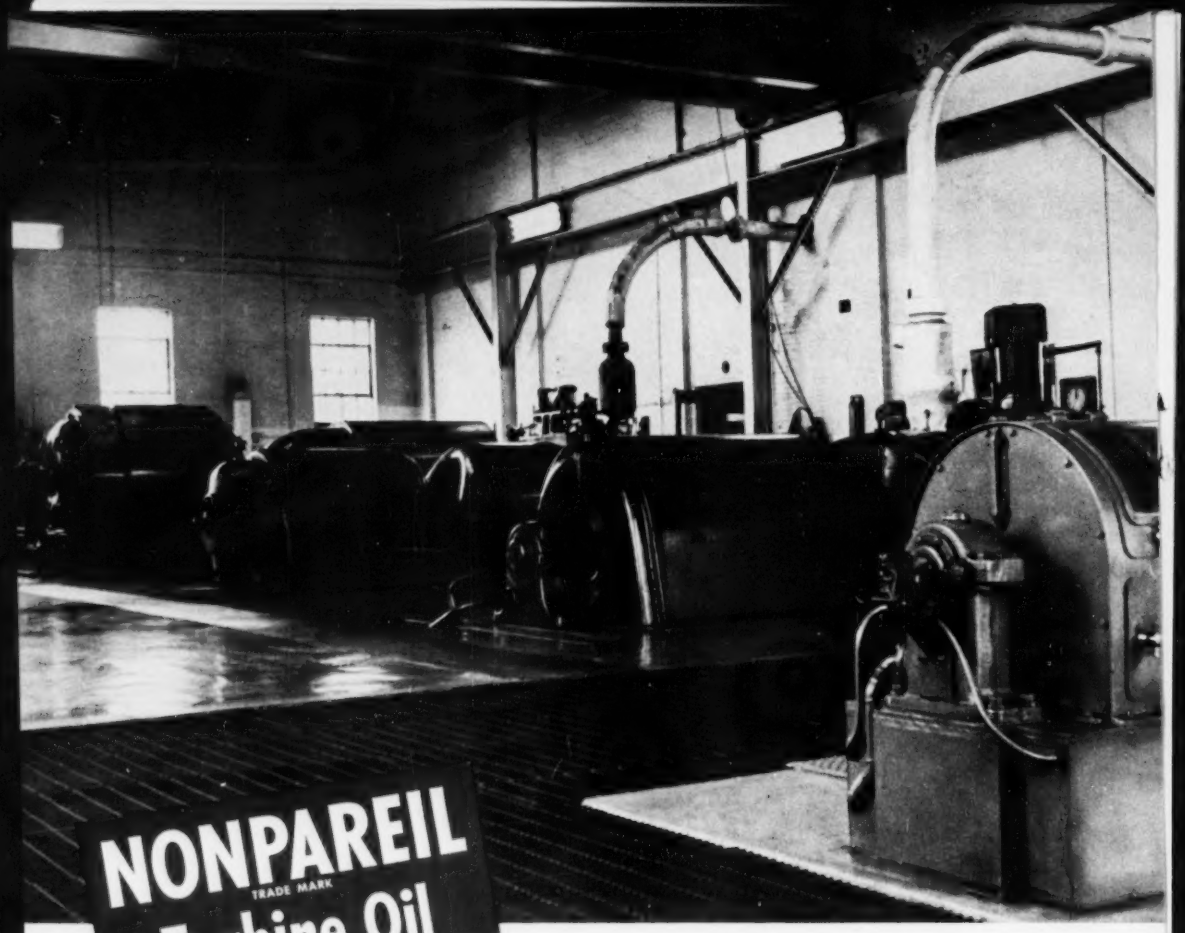

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